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	PAGE
GEO. A. DEAN. Grasshopper Control Work in Western Kansas	67
J. A. DEW. Some Properties of Various Forms of Arsenate of Lead	162
H. E. EWING. Some Coccinellid Statistics	440
E. P. FELT. <i>Acanthodes pseudococci</i> n. sp.	148
The Reaction of Sugar Maples to Miscible Oils*	173
Notes on Forest Insects	373
List of Zoöphagous Ronididae	458
<i>Arthrocnodax constricta</i> n. sp.	481
H. T. FERNALD and A. I. BOURNE. Notes on the Onion Thrips and the Onion Maggot	196
D. E. FINK. Ammonia Gas as a Fumigant	149
Injury to Truck Crops by Spring-Tails	400
W. P. FLINT. On the Capture of Living Insects by the Corn-field Ant, <i>Lasius niger americanus</i>	476
ARTHUR GIBSON. A New Destructive Cutworm of the Genus <i>Porosagrotis</i> Occurring in Western Canada	201
A. A. GIRAULT. The Probable Best Method of Rearing Certain Scarabæid Larvæ	445
R. W. GLASER. *The Economic Status of the Fungous Diseases of Insects	473
W. H. GOODWIN. Some Factors Affecting Results in the Use of High Temperatures for the Control of Insects Injuring Cereal Products	313
LEONARD HASEMAN. Bee-keeping and Apiary Inspection in Missouri	96
Nursery and Orchard Inspection Work in Missouri	124
Entomological Work in Missouri	376
T. J. HEADLEE. Anti-Mosquito Work in New Jersey	260
Some Data on the Effect of Temperature and Moisture on the Rate of Insect Metabolism	413
G. W. HERRICK. The Oviposition of Two Apple Pests	189
C. G. HEWITT. The Occurrence of the Warble Fly, <i>Hypoderma bovis</i> , in Canada *	195
Canada Prohibits Importation of Nursery Stock through the Mails	151
Sterility in Oats Caused by Thrips	211

* Withdrawn for publication elsewhere.

CONTENTS

	Page
Further Observations on the Breeding Habits and Control of the House-Fly, <i>Musca domestica</i>	281
W. E. HYDE. County Organization in the Campaign against the Boll Weevil	65
Reducing Insect Injury to Stored Corn	203
H. E. HODGKISS and P. J. PARROT. The Parasites of the San José Scale in New York	227
L. O. HOWARD. A Note on Sigismund Mokshetsky and His Work in the Crimea	247
An Incident in the Search for Foreign Gypsy-Moth Parasites	378
The Education of the Entomologists in the Service of the U. S. Department of Agriculture	275
S. J. HUNTER and P. W. CLAASSEN. Grasshopper Control in the Southern Division of Kansas	73
W. D. HUNTER. Quarantine against the Mexican Cotton Boll Weevil	234
S. J. HUNTER. The Sandfly and Pellagra, III	293
J. A. HYSLOP. Soil Fumigation	305
J. F. ILLINGWORTH. Further Notes on the Breeding of the Tachinid Fly Parasite on the Cane Beetle Borer	390
A New Pest of Cane in Fiji, <i>Sphenophorus achilaeus</i> Mely	414
T. H. JONES. Additional Notes on Porto Rican Sugar-cane Insects	461
E. O. G. KELLY. Notes on the Biology of <i>Diplazon latatorius</i>	294
G. B. KING. A New Species of Kermes from Connecticut	150
The Genus <i>Pseudokermes</i> in Montana	246
J. L. KING. Contributions to the Life History of the Lesser Peach Borer in Ohio	401
ROBERT MATHESON. The San José Scale in Nova Scotia	141
J. W. MCCOLLOCH and H. YUASA. A Parasite of the Chinch Bug Egg	219
E. A. MCGREGOR. Red Spider Control	324
The Serpentine Leaf-miner on Cotton	447
A. L. MELANDER. Can Insects Become Resistant to Sprays?	167
C. L. METCALF. Egg-Laying Habits of the Pecan Twig Girdler	218
Z. P. METCALF. Report of Field Work on Southern Corn Bill Bug*	83
A. W. MORRILL. Experiments with House-Fly Baits and Poisons	268

*Withdrawn for publication elsewhere.

	PAGE
* F. H. MOSHER and R. T. WEBBER. The Relation of Variation in the Number of Larval Stages to Sex Development in the Gipsy Moth	368
WILMON NEWELL. A Simple and Economical Method of Filing Entomological Correspondence	87
The Essentials of a Good Apiary Inspection Law	92
A Natural Enemy of the Argentine Ant	147
W. C. O'KANE. Further Experience with an Insectary	181
W. A. ORTON. Plant Quarantine Problems	109
HERBERT OSBORN. Economic Notes on Leaf Hoppers in Maine*	192
F. B. PADDOCK. Observations on the Bee-moth	183
J. R. PARKER. The Life History of the Sugar-beet Root-louse, <i>Pemphigus betæ</i>	136
T. H. PARKS. Effect of Temperature upon the Oviposition of the Alfalfa Weevil, <i>Phytonomus pusillus</i> Gyll.	417
P. J. PARROTT. The Growth and Organization of Applied Entomology in the United States	50
J. M. PRAIRIS. The Relation of Temperature to Insect Development	174
D. M. ROGERS. The Gipsy and Brown-tail Moth Quarantine	116
S. A. ROHWER. Description of a New Sawfly Injurious to Strawberries	479
E. W. RUST. Notes on Coccide Found in Peru	467
J. G. SANDERS. Uniform State Inspection Laws	102
F. R. SASSER. Notes on Entomological Inspection in the District of Columbia	240
W. M. SCOTT. The California Pear Thrips in Maryland	478
V. E. SUELFORD. The Importance of the Measure of Evaporation in Economic Studies of Insects	229
The Use of Atmometers to Measure Evaporation in the Study of Insects	249
PERLEY SPAULDING. Inspection for Plant Diseases	106
O. H. SWEZEY. The Introduction of a Tachinid Parasite of the Sugar Cane Weevil Borer in Hawaii	455
H. V. TARTAR. On the Valuation of Lime-sulfur as an Insecticide	463
D. G. TOWER. Notes on the Life History of <i>Prospaltella perniciosi</i> Tower	422

*Withdrawn for publication elsewhere.

CONTENTS

vij

	Page
C. H. T. TOWNSEND. Progress of Verruga Work with <i>Phlebotomus verrucarum</i> T.	357
F. L. WASHBURN. Today's Work in Applied Entomology*	64
F. L. WASHBURN and A. J. SPANGLER. A Few Problems in Connection with the Administration of the Minnesota Inspection Law	119
J. L. WEBB. Notes on the Rice Water-weevil, <i>Lissorhaptus simplex</i>	432
F. M. WEBSTER. An Unrecorded Parasite of <i>Toxoptera graminum</i>	403
H. B. WEISS. <i>Agrilus pallidus</i> Say Infesting Roses	438
R. D. WHITMARSH. The Green Soldier Bug, <i>Nezara hilaris</i>	336
G. N. WOLCOTT. Notes on the Life History and Ecology of <i>Tiphia inornata</i> Say	382
W. C. WOODS. A Note on <i>Rhycoltis pomonella</i> in Blueberries	398

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Second Annual Meeting, Champaign, Ill., Nov. 11-13, 1890. (The same officers had charge of this meeting.)

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Eighth Annual Meeting, Buffalo, N. Y., Aug. 21-22, 1896. President, C. H. Fernald; First Vice-President, F. M. Webster; Second Vice-President, Herbert Osborn; Secretary, C. L. Marlatt.

Ninth Annual Meeting, Detroit, Mich., Aug. 12-13, 1897. President, F. M. Webster; First Vice-President, Herbert Osborn; Second Vice-President, Lawrence Bruner; Secretary, C. L. Marlatt.

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Hegner, Robert W., University of Michigan, Ann Arbor, Mich.
Hertzog, P. M., Hightstown, N. J.
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Hollister, W. O., Kent, Ohio.
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Jones, C. R., Manila, P. I.
Jones, T. H., Rio Piedras, Porto Rico.
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Young, D. B., State Museum, Albany, N. Y.

FOREIGN MEMBERS

- Anderson, T. G., Nairobi, British East Africa.
 Ballou, H. A., Imperial Department of Agriculture, Barbados, West Indies.
 Berlese, Dr. Antonio, Reale Stazione di Entomologia Agraria, Firenze, Italy.
 Bordage, Edmond, Directeur de Musée, St. Denis, Réunion.
 Carpenter, Dr. George H., Royal College of Science, Dublin, Ireland.
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 Kourchunoff, N., Opytnoe Pole, Poltava, Russia.
 Kulagin, Nikolai M., Landwirtschaftliches Institut, Petroskoje, Moscow, Russia.
 Kuwana, S. I., Imperial Agricultural Experiment Station, Nishigahara, Tokio, Japan.
 Lampé, Prof. Sven, Statens Entomologiska Anstalt, Stockholm, Sweden.
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 Leonardi, Gustavo, R. Scuola di Agricoltura, Portici, Italy.
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 Mussen, Charles T., Hawkesbury Agricultural College, Richmond, New South Wales.
 Nawa, Yashushi, Entomological Laboratory, Kyomachi, Gifu, Japan.
 Newstead, Robert, University School of Tropical Medicine, Liverpool, England.
 Porchinski, Prof. A., Ministère de l'Agriculture, St. Petersburg, Russia.
 Porter, Carlos E., Casilla 2352, Santiago, Chile.
 Pospelow, Dr. Walrenar, Station Entomologique, Rue de Boulevard, No. 9, Kiev, Russia.
 Reed, Charles S., Mendoza, Argentine Republic, South America.
 Ritzema Bos, Dr. J., Agricultural College, Wageningen, Netherlands.
 Roewndfeld, A. H., Estacion Experimental Agricola, Tucuman, Argentina.
 Rutherford, Andrew, Botanic Gardens, Peradeniya, Ceylon.
 Sajo, Prof. Karl, Gödöllő-Veresegyház, Hungary.
 Schøyen, Prof. W. M., Zoological Museum, Christiania, Norway.
 Severin, Prof. G., Curator Natural History Museum, Brussels, Belgium.
 Shipley, Prof. Arthur E., Christ's College, Cambridge, England.
 Silvestri, Dr. F., R. Scuola Superiore di Agricoltura, Portici, Italy.

Theobald, Frederick V., Wye Court, Wye, Kent, England.

Thompson, Rev. Edward H., Franklin, Tasmania.

Tryon, H., Queensland Museum, Brisbane, Queensland, Australia.

Urich, F. W., Victoria Institute, Port of Spain, Trinidad, West Indies.

Vernorel, V., Station Viticole, Villefranche, Rhone, France.

JOURNAL OF ECONOMIC ENTOMOLOGY

OFFICIAL ORGAN AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS

Vol. 7

FEBRUARY, 1914

No. 1

Proceedings of the Twenty-sixth Annual Meeting of the American Association of Economic Entomologists

The twenty-sixth annual meeting of the American Association of Economic Entomologists was held at the Atlanta Medical College, Atlanta, Ga., December 31, 1913, to January 2, 1914.

The meeting of the section on Apiary Inspection was held at 10.30 a. m., January 1, and the section on Horticultural Inspection at 1.30 p. m., at the same institution, and an adjourned session was held in the evening at the Ansley Hotel.

The business proceedings of the Association is given in Part I, while the addresses, papers, and discussions will be found in Part II of this report.

The proceedings of the sections will be prepared by the section secretaries and published as parts of this report.

PART I BUSINESS PROCEEDINGS

The meeting was called to order by President P. J. Parrott at 1.30 p. m., Wednesday, December 31, 1913.

The attendance at the meeting averaged about 100 members and visitors. The following members were present:

J. M. Aldrich, Lafayette, Ind.	S. C. Chapp, Raleigh, N. C.
George G. Atwood, Albany, N. Y.	A. E. Conradi, Clemson College, S. C.
G. M. Bentley, Knoxville, Tenn.	Mel T. Cook, New Brunswick, N. J.
E. W. Berger, Gainesville, Fla.	R. A. Cooley, Bozeman, Mont.
W. E. Britton, New Haven, Conn.	E. C. Cotton, Knoxville, Tenn.
J. E. Buck, Auburn, Ala.	J. J. Culver, Melrose Highlands, Mass.
A. F. Burgess, Melrose Highlands, Mass.	George A. Dean, Manhattan, Kan.
W. W. Chase, Atlanta, Ga.	J. A. Dew, Auburn, Ala.
P. W. Claason, Lawrence, Kan.	E. P. Felt, Albany, N. Y.

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| H. T. Fernald, Amherst, Mass. | A. W. Morrill, Phoenix, Ariz. |
| E. H. Gibson, Greenwood, Miss. | Wilmon Newell, College Station, Texas. |
| P. A. Glenn, Urbana, Ill. | W. C. O'Kane, Durham, N. H. |
| R. W. Harned, Agricultural College, Miss. | Herbert Osborn, Columbus, Ohio. |
| T. J. Headlee, New Brunswick, N. J. | F. B. Paddock, College Station, Texas. |
| Gleun W. Herrick, Ithaca, N. Y. | P. J. Parrott, Geneva, N. Y. |
| C. Gordon Hewitt, Ottawa, Canada. | L. M. Peairs, Morgantown, W. Va. |
| W. E. Hinds, Auburn, Ala. | R. H. Pettit, East Lansing, Mich. |
| T. E. Holloway, Audubon Park, La. | W. V. Reed, Atlanta, Ga. |
| J. R. Horton, New Orleans, La. | W. A. Riley, Ithaca, N. Y. |
| J. S. Houser, Wooster, Ohio. | W. E. Rumsey, Morgantown, W. Va. |
| L. O. Howard, Washington, D. C. | J. G. Sanders, Madison, Wis. |
| S. J. Hunter, Lawrence, Kan. | E. R. Sasseer, Washington, D. C. |
| W. D. Hunter, Washington, D. C. | W. J. Schoene, Blacksburg, Va. |
| A. H. Jennings, Washington, D. C. | W. M. Scott, Baltimore, Md. |
| R. W. Leiby, Ithaca, N. Y. | N. E. Shaw, Columbus, Ohio. |
| A. C. Lewis, Atlanta, Ga. | V. E. Shelford, Chicago, Ill. |
| U. C. Loftin, New Orleans, La. | Franklin Sherman, Jr., Raleigh, N. C. |
| A. D. MacGillivray, Urbana, Ill. | Henry Skinner, Philadelphia, Pa. |
| C. J. Marlatt, Washington, D. C. | A. J. Spangler, St. Anthony Park, Minn. |
| P. W. Mason, Lafayette, Ind. | Charles Spooner, Atlanta, Ga. |
| J. W. McColloch, Manhattan, Kan. | H. E. Summers, Ames, Iowa. |
| E. A. McGregor, Batesburg, S. C. | F. L. Washburn, St. Anthony Park, Minn. |
| A. L. Melander, Pullman, Wash. | W. M. Wheeler, Boston, Mass. |
| C. L. Metcalf, Raleigh, N. C. | G. N. Wolcott, Dallas, Tex. |
| Z. P. Metcalf, West Raleigh, N. C. | E. L. Worsham, Atlanta, Ga. |
| | W. W. Yothers, Orlando, Fla. |

PRESIDENT P. J. PARROTT: I have the honor of calling together the twenty-sixth annual meeting of this Association, and we will first listen to the report of the Secretary.

REPORT OF THE SECRETARY

The membership in the Association has been slightly increased during the past year. Since the Cleveland meeting two active, two associate, and one foreign member have died, and two active and four associate members have been dropped from the rolls on account of non-payment of dues.

The total membership to date is 131 active, 189 associate and 53 foreign, which makes a net gain for the year of 24 members.

On February 23, 1913, Miss Marie E. Murtfeldt, one of the pioneer members of this Association, died at her home at Kirkland, Mo.

February 12, 1913, Mr. C. W. Hooker died following an operation for appendicitis at Mayaguez, P. R.

August 18, 1913, Mr. Harry Pinkus died at Dallas, Texas.

October 15, 1913, Mr. A. G. Hammar died as a result of being accidentally shot while on a gunning expedition.

September 2, 1913, Mr. Ezio Reuter of Helsingfors, Finland, died.

SUGGESTIONS CONCERNING THE JOURNAL

The subscription list of the JOURNAL has increased slightly during the past year, but not as much as should have been the case. The secretary would suggest that the members of the Association can contribute materially to the success of the JOURNAL by influencing people who are interested in entomology to become subscribers. It is practically impossible for the editorial staff to make a thorough canvass and obtain as many subscribers as ought to be on our list. If the members will interest themselves in this matter the number of subscribers should be materially increased during the coming year. Every institution in which entomology is studied, and most libraries, could use this publication profitably, and it is hoped that the members will assist in increasing the number of our subscribers by advising any institutions or libraries with which they may be connected, to subscribe for our publication.

During the past year the first two numbers of the JOURNAL contained a large number of pages in order that the proceedings of the annual meeting might be published promptly. If the page numbers had been kept down to the number usually contained in an issue, some of the papers presented at the meeting would not have been published before June or August.

FINANCIAL STATEMENT

The following statement shows a balance in favor of the Association. It does not indicate, however, a number of liabilities which must be met within the next month. Practically all the bills incurred by the JOURNAL have been paid except the cost of printing the last issue.

A large number of the members have already paid their dues and subscription to the JOURNAL for the year 1914. If all Association bills had been paid at the time our books were closed, the expenditures and receipts for the year would practically balance.

Association Statement

Balance in Treasury, December 23, 1912.....	\$319.26	
By amount received for dues, etc., 1913.....	227.96	
To stenographic report 1912 meeting.....	\$25.00	
Stamps and stamped envelopes.....	35.20	
Printing.....	37.50	
Printing, Committee on Entomological Investigations.....	8.80	
Committee on Incorporation.....	1.44	
Telegraph and express.....	3.74	
Clerical work, Secretary's office.....	26.75	
One-half salary of Secretary.....	50.00	
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	\$188.43	
Balance, December 22, 1913.....	358.79	
	<hr/>	
	\$547.22	\$547.22

Journal Statement

Balance in Treasury, December 18, 1912.....	\$223.81	
By amount received from subscriptions, advertising, etc., 1913.....	1,802.38	
To Stamps and stamped envelopes.....	\$43.75	
Printing.....	1,272.53	
Halftones, etc.....	92.85	
Telegraph and express.....	1.05	

Miscellaneous supplies.....	\$15.20	
Clerical work Editor's office.....	70.00	
Clerical work Manager's office.....	45.00	
Salary, Editor.....	100.00	
One-half salary of Manager.....	50.00	
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	\$1,690.38	
Balance in Treasury, December 22, 1913.....	335.81	
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	\$2,026.19	\$2,026.19

Respectfully submitted,

A. F. BURGESS,

Secretary.

On motion the report was received and the financial part referred to the auditing committee.

PRESIDENT P. J. PARROTT: I will read the report of the Executive Committee.

REPORT OF THE EXECUTIVE COMMITTEE

December 31, 1913.

To the American Association of Economic Entomologists:

GENTLEMEN:—As there has been no apparent necessity for a meeting, the Executive Committee has conducted its work by personal interview of individual members and by correspondence, and begs to present the following report:

By the vote of the Association at its last meeting the invitation from the directors of the Panama-Pacific Universal Exposition for this Association to hold its sessions in 1915 at the Exposition in San Francisco was referred to the Executive Committee for action. The Executive Committee authorized the Secretary, in his acknowledgment of the invitation to inform the Executive Officer of the Exposition that it was the custom of the Association to hold its yearly meeting in connection with the annual assembly of the American Association for the Advancement of Science and that, as in the past, the location of the meeting of this organization for that year would undoubtedly be governed by the movements of the latter association.

The resolution of this Association, relative to the organization of the International Congress of Entomologists, in which emphasis was specially laid upon the desirability of the adoption of a constitution at an early date with provisions for delegate representation and adequate voting power of the various entomological societies of the world, was forwarded by your Secretary in due season to the officers of the next congress.

In accordance with the resolution of the special committee on Bibliography of Economic Entomology, the Executive Committee brought to the attention of the Honorable Secretary of Agriculture the importance and desirability of the publication up to date of this most useful work. Failing in this attempt, nothing further was done with this matter until the change of administration, when the proposition was kindly placed by Mr. C. L. Marlatt before the committees appointed by the present Secretary, who directs the publications of the Department of Agriculture. The Executive Committee was later informed that the adoption of entirely new regulations governing the publications of this Department made it quite unlikely that the compilation and publication of the Bibliography of Economic Entomology would

be continued, as there seems to be no provision in the new plans for publications of this character. Therefore, following the suggestion in the report of the special committee, a committee of three members consisting of Dr. W. E. Britton, Dr. E. P. Felt and Mr. J. J. Davis were appointed to consider the question of maintaining the bibliography by other means. That committee will present a statement at this meeting.

The Second International Congress of Entomology at Oxford, during 1913, unanimously passed certain resolutions creating and directing an International Committee on Nomenclature. One of the duties of this committee is to enter into communication with the entomological societies of the world in order to form national committees on nomenclature. At the request of Dr. Karl Jordan, Secretary of the International Committee, who has performed this service for the European societies Mr. Nathan Banks consented to undertake similar work for the American organizations. As Mr. Banks desired the appointment of two members from the Association of Economic Entomologists to serve on the American National Committee, the President asked Professor Herbert Osborn and Dr. A. D. MacGillivray to act in this capacity, which they consented to do.

The resolution, regretting the discontinuance of the reviews of the principal injurious insects of the year as formerly published in the Yearbook of the Department of Agriculture, and petitioning the Chief of the Bureau of Entomology to prepare such for publication in the JOURNAL OF ECONOMIC ENTOMOLOGY, was brought to the attention of Dr. L. O. Howard by the Executive Committee. Doctor Howard informed the committee that he would gladly furnish such a review, which would be prepared by the chiefs of the sections in the Bureau, if such a report were really demanded by the leading members of the Association. As the committee was in doubt as to its powers, no definite plans were made for the continuance of these reviews, and if it is still the desire of the Association to have such published in the JOURNAL OF ECONOMIC ENTOMOLOGY, further consideration should be given to this matter at this meeting.

P. J. PARROTT,
E. L. WORSHAM,
WILMON NEWELL,
A. F. BURGESS,
Committee.

On motion the report was adopted and placed on file.

PRESIDENT P. J. PARROTT: We will now listen to the report of the Employment Bureau by Mr. F. L. Washburn.

REPORT ON THE WORK OF THE EMPLOYMENT BUREAU

January 1, to December 31, 1913

A few remarks on the work of the Bureau may not be out of place at this time. While the work of this last season has increased over that of the previous and initial year of its existence, it has not been arduous. We could not allow it to become so and still do what is called for from us as entomologists, although we have used all effort possible to place our men.

We realize, however, while we feel that the Bureau is really making good and is a promising project, that one could easily devote twice the energy and time to it that we have been able to do, with a corresponding increase, of course, in its efficiency. We were at first, during last year and the first part of the present year, somewhat despondent regarding the success of the undertaking, but recently it has appeared

to be of much more interest than in the beginning and calling to itself more patronage.

While we have had several inquiries, evidently due to the advertisement in the JOURNAL, we have found that we could well supplement this by sending out circular letters to agricultural colleges and stations. Such letters brought quite a few responses and we have had several inquiries in reply and have been instrumental, we believe, in filling at least one of the higher ranking positions with a good man and obtaining positions of minor rank for others.

The enrollment has been characterized by the presence, on the one hand, of a few men of perhaps national and even international reputation. As a rule, however, as we all know, the seasoned workers, those who through ability and experience stand high in the profession, do not make use of any form of agency since they are approached directly by those seeking their services. These men ask salaries ranging from \$1,800 as the minimum to \$3,000 as the maximum; on the other hand, the Bureau is largely patronized by beginners, some of whom are willing to accept positions as student assistants, offering an income of from \$250 to \$300. Others want from \$500 to \$800 as a beginning salary. Then there is, between these two extremes, an intermediate class, of really good men seeking initial salaries of from \$1,000 to \$1,200. I do not wish to convey the idea, by these statements, that the Bureau has a large enrollment, but the above conditions are represented by even the limited number of names on our books.

You will realize the difficulty experienced by us in trying to fill positions which demand much of a young man, yet offering only salaries which will attract the younger or less experienced entomologists,—salaries very close to the minimum mentioned above. Again, it is sometimes hard to please the younger men who seek help through our services. There are some who are impatient,—almost insistent that their special applications should be pushed, and critical if no results are obtained,—critical even to the point of asking for their money back. This request for the return of the fee, it must be said, happened in only one instance. We have had, repeatedly, to state to these younger men the object of the Employment Bureau, namely, that it is organized to bring in touch institutions who desire men for entomological work, with entomologists seeking positions and that we make it a rule not to push any one candidate in preference to another.

In at least one instance, it would appear that a candidate who has been placed and yet desires a better paying position looks upon the Bureau as still bound, under the terms of his initial enrollment and payment of fee, to seek to better his position. The Bureau would be very glad to have from the Association, suggestions covering this condition.

In conclusion, we believe that the Employment Bureau has a place in the work of entomologists and that it will make good. It is evident that it requires considerable attention on the part of the one directing the work and, as said before,—the more attention given—the more accomplished. We feel that we have given all the time possible for us to give in this line, and beg leave to present our resignation at this meeting in our capacity as Director of the Bureau.

FINANCIAL STATEMENT

F. L. Washburn

In account with the Employment Bureau, Dr.

Cash on hand January 1, 1913.....	\$12.50
To 13 subscriptions between January 1, 1913, and December 31, 1913, at \$2.00.....	26.00
	<hr/> \$38.50

Cr.

By four subscriptions (refunded as authorized by Association in

January, 1913) at \$2.00.....	\$8.00
By stamps used.....	4.00
By stationery used.....	2.00
By advertisement in JOURNAL.....	.25
	—————
	\$14.25
Balance, cash on hand.....	\$24.25

F. L. WASHBURN.

Voted that the report be accepted and the recommendations adopted.

PRESIDENT P. J. PARROTT: I will now call for the report of the Committee on Entomological Investigations, by Mr. W. C. O'Kane.

REPORT OF COMMITTEE ON ENTOMOLOGICAL INVESTIGATIONS, 1913-14

Compiled by W. C. O'KANE

Investigations dealing with Mammalia

Nebraska, Lincoln,—Myron H. Swenk.

The prairie-dog.

Substantial progress. Preliminary publication contemplated.

New Mexico, State College,—D. E. Merrill.

Prairie-dogs.

Collecting data as to distribution, numbers, and damage, looking toward efforts at control.

Rodents.

Tests of poisons, traps, etc. Scattering.

Investigations dealing with Crustacea

Mississippi, Agricultural College,—R. W. Harned, R. N. Lobdell.

The crayfish of Mississippi.

Slight progress during the past year.

Investigations dealing with Acarina

Montana, Bozeman,—R. A. Cooley.

Tick investigations in Montana with particular reference to *Dermacentor venustus*.

North Carolina, Raleigh,—Franklin Sherman, Jr.

Red spider on cotton,—C. L. Metcalf, Assistant.

Observations on life history, habits, etc. Begun last year; will continue.

New York, Geneva,—P. J. Parrott.

Monographic study of the *Eriophyidae* of New York. In immediate charge of H. E. Hodgkiss.

Ohio, Wooster,—H. A. Gossard.

Mites affecting live stock and poultry. D. C. Mote.

(Dept. Animal Husbandry, in cooperation with Dept. Entomology.)

Treatment of mites affecting stored products and greenhouse plants.

Experiments by Goodwin, Gossard and Whitmarsh.

Oregon, Corvallis,—H. F. Wilson.
The red spider mites of Oregon.

Tennessee, Knoxville,—E. C. Cotton.
North American fever tick.

Investigations dealing with Thysanoptera

Connecticut, New Haven,—W. E. Britton.
Control of onion thrips.
Beginning made.

Florida, Gainesville,—J. R. Watson.
Thrips on tomatoes.

Massachusetts, Amherst,—H. T. Fernald.
Methods for the control of onion thrips on large fields.
Work completed.

New Mexico, State College,—D. E. Merrill.
Onion thrips.
Very little was done this last year on account of shortage of funds.

New York, Cornell University, Ithaca,—Glenn W. Herrick.
An investigation of onion thrips in New York. J. C. Faure in charge.
The work is completed.

New York, Geneva,—P. J. Parrott.
The life history, habits and distribution in New York of the pear thrips, *Euthrips pyri*.

Investigations dealing with Mallophaga and Anoplura

California, Stanford University,—V. L. Kellogg.
Preparation of complete mammalian host list (with distribution of the hosts) of the known Mallophaga and Anoplura, with study of the significance of the host and geographic distribution of the parasites.

The host list completed: the study under way.
(with S. Nakayama). Comparative morphology of the Mallophaga and Anoplura, and the taxonomic study of collections from mammals of California, birds of Antarctic Ocean, Scotland, England, etc.
Work well under way.

New York, Cornell University, Ithaca,—Glenn W. Herrick.
The Mallophaga of domestic fowls.

Investigations dealing with Orthoptera

Kansas, Manhattan,—Geo. A. Dean.
Habits and life history of injurious grasshoppers, together with methods of control.
Geo. A. Dean.
Parasitic and predaceous enemies of grasshoppers, Paul S. Welch.

Nebraska, Lincoln,—Myron H. Swenk.
Grasshopper control. Lawrence Bruner in charge.
Substantial progress.

New Mexico, State College,—D. E. Merrill.

Grasshoppers.

Experiments made with hopperdozer looking toward its use in irrigated fields.

Also furthered the investigations into habits of the damaging species of grasshoppers.

New York, Geneva,—P. J. Parrott, B. B. Fulton.

Life histories, habits and means of controlling the tree crickets, *Ovirus* and related species.

Ohio, Wooster,—H. A. Gossard.

Survey of Orthoptera of Wayne County, Ohio, and incidentally of Ohio, as opportunity offers. Life history and economic control studies.

Washington, Pullman,—A. L. Melander.

Grasshoppers.

An unusual outbreak in Eastern Washington was studied this fall.

Investigations dealing with Hemiptera

Arizona, Phoenix,—A. W. Merrill.

Miscellaneous aphid investigations—Control of the several aphid pests in field and garden.

Preliminary work. O. C. Bartlett in charge.

Arkansas, Fayetteville,—George G. Becker.

(I) The supposed immunity of Northern Spy stock to the attacks of woolly aphid.

(II) Studies of the relationship of woolly aphid to its various hosts.

Substantial progress.

Canada, Guelph,—Lawson Caesar.

Capsids and closely allied insects attacking apples.

San José scale, its distribution in Ontario, and control measures, especially in old orchards.

Completed, bulletin soon ready for press.

Colorado, Fort Collins,—C. P. Gillette.

Life histories, food plants and remedies for the plant lice of Colorado.

Life history and methods of controlling the tomato psyllid. S. Arthur Johnson in immediate charge.

Connecticut, New Haven,—W. E. Britton.

Control of pea aphid by spraying.

Florida, Gainesville,—J. R. Watson.

White fly studies.

Illinois, Urbana,—S. A. Forbes.

Tests on a large scale of improved methods of individual and community operation against outbreaks of the chinch bug.

Iowa, Ames,—R. L. Webster.

Oyster shell scale, *Lepidosaphes ulmi*.

Kansas, Manhattan,—Geo. A. Dean.

Chinch bug control, Geo. A. Dean and J. W. McColloch.

Chinch bug egg parasite, J. W. McColloch.

Control of San José scale, J. H. Merrill.

Maine, Orono,—Edith M. Patch.

Ecological and morphological investigations of Aphididae.

Ecological and morphological investigations of Psyllidae.

Minnesota, St. Anthony Park,—F. L. Washburn.

Minnesota scale insects. W. Moore in immediate charge.

Mississippi, Agricultural College,—R. W. Harned, E. W. Stafford.

Scale insects of Mississippi (food habits and life history of the native species).

Some progress.

Missouri, Columbia,—Leonard Haseman.

The tarnished plant bug and its work on peach and other plants.

Well under way.

The apple leaf hopper.

Well under way.

The distribution of the various broods of the Periodical Cicada occurring in Missouri.

Reports completed this season.

The control of San José scale.

Just beginning a systematic campaign for the control of this pest throughout the state in connection with the enforcement of the recently enacted Nursery and Orchard Inspection Law.

Montana, Bozeman,—R. A. Cooley.

Life history and control of the sugar beet louse (*Pemphigus betæ*).

Study of the control of the oyster shell scale by use of insecticides.

New York, Geneva,—P. J. Parrott, H. E. Hodgkiss.

Life history, habits and means of protecting pear orchards from the false tarnished plant-bug, *Lygus invidus* Say.

A study of the activities of the late summer broods of the Pear Psylla and finding of more efficient means of control.

The life history, habits and means of controlling the grape leaf hopper. F. Z. Hartzel in immediate charge.

New Mexico, State College,—D. E. Merrill.

The grape leaf hopper.

Experiments as to control in the vineyard; detailed life history. Probably will finish next season.

San José scale.

Some summer spraying to test effectiveness.

North Carolina, Raleigh,—Franklin Sherman, Jr.

Laundry soap in water as a remedy for aphids.

This project will be continued. It is believed that simple solutions of this material are preferable to the more complex emulsions, more available than tobacco extracts, and just as satisfactory,—hence to be recommended, especially for small-scale operations, as in gardens, etc.

North Carolina, West Raleigh,—Z. P. Metcalf.

Life history and methods of controlling the gloomy scale, *Chrysomphalus tenebri-cosus* Comst.

In progress.

Ohio, Wooster,—H. A. Gussard.

Life history and economic control studies of *Ohio Pentatomide*.

Life histories of several species practically completed. R. D. Whitmarsh.

Ohio Coccidae. General state survey

Several new records for the state. Control measures especially for species affecting shade and ornamental trees. J. S. Houser.

Lice affecting live stock and poultry and control measures. D. C. Mote. (Dept.

Animal Husbandry in cooperation with Dept. Entomology).

Apple root louse. Control, etc. J. S. Houser.

Peru, S. A., Lima,—Charles H. T. Townsend.

Under the supervision of Dr. Townsend, Mr. E. W. Rust has mounted and identified a large proportion of the Coccid material gathered during the past four years in Peru. Peruvian parasites of *Saissetia* have been sent to the California State Insectary, arriving there alive and in good condition.

White Scale of cotton (*Henichionaspis minor*) and its parasites.

Coccids and microhymenopterous parasites of the same in Peru.

Tennessee, Knoxville,—E. C. Cotton.

The hog louse.

Virginia, Norfolk,—T. C. Johnson

Life history of the spinach aphid.

Cabbage aphid.

Pea aphid.

Cucumber aphid.

} In charge of F. H. Chittenden.

Washington, Pullman,—A. L. Melander.

Viability of the San José scale in different districts of the State, using identical insecticides and determining the period lapsing before death.

Last spring over 300,000 scales were examined.

West Virginia, Morgantown,—W. E. Rumsey.

The control of the apple tree aphid through the destruction of its eggs.

Lime-sulfur proved better than any other substance tried. Will be continued another season.

The control of the woolly aphid.

Not yet begun.

Wisconsin, Madison,—J. G. Sanders.

Life history studies of the apple aphids in Wisconsin.

Investigations dealing with Lepidoptera

Arkansas, Fayetteville,—George G. Becker.

Life history and methods of control of *Sanninoidea exilis*.

Substantial progress.

Arizona, Phoenix.—A. W. Morrill.

Life history and control of the codling moth under the widely varying conditions found in Arizona.

Banding and other records continued.

Colorado, Fort Collins.—C. P. Gillette.

Life history and better measures of controlling the codling moth in Colorado.

Fruit-tree leaf roller investigations. George P. Weldon in immediate charge.

Connecticut, New Haven.—W. E. Britton.

Life history of a leaf roller, *Archips rosana* Linn., attacking privet hedges.

Completed and being prepared for publication. B. H. Walden.

Connecticut, Storrs.—G. H. Lamson.

The use of lugs in controlling the codling moth in apple orchards.

Florida, Gainesville.—J. R. Watson.

Heliothis obsoleta on tomatoes.

The life history and control of *Intercarsia gemmatilis* Hbn. on velvet beans.

Indiana, Lafayette.—James Troop.

The life history of the codling moth for northern, central and southern Indiana.

Number of broods of the fall army worm in north and south ends of the State of Indiana.

Kansas, Manhattan.—Geo. A. Dean.

Life history and measures of controlling the corn ear worm. J. W. McColloch.

Minnesota, St. Anthony Park.—F. L. Washburn.

Spraying investigations. A. G. Ruggles in immediate charge.

Missouri, Columbia.—Leonard Hascman.

The unspotted tentiform leaf miner of the apple.

Ready to report.

Peach tree borer.

Just begun.

Montana, Bozeman.—R. A. Cooley.

Life histories and means of controlling the cutworms of Montana.

Nebraska, Lincoln.—Myron H. Swenk.

Cutworm injury to Nebraska crops.

Considerable data accumulated.

New Mexico, State College.—D. E. Merrill.

Peach worm (*Anarsia lineatella*).

Work on life history here fairly complete; will finish that this year and try various control measures.

New York, Geneva.—P. J. Parrott.

The life history, habits and distribution of the apple and cherry ermine moths.

New York, Albany.—E. P. Felt.

A study of the efficiency of spraying for the control of the codling moth.

In the Hudson Valley under normal crop conditions one thorough application results in 95-98 per cent of worm-free fruit.

New York, Cornell University, Ithaca. — Glenn W. Herrick.
Further experiments in the control of the fruit-tree leaf-roller.

This will consist mainly of a series of cooperative experiments.
Life history and control of the codling moth in western New York. — R. W. Braucher
in charge.

The work on the life history is practically completed.
The canker worms of New York. — F. W. Petter in charge.

The work has just been begun.

North Carolina, West Raleigh. — Z. P. Metcalf.
Investigations of the imported cabbage web worm, *Hollaba uadalis* Fabr.
In progress.

Ohio, Wooster. — H. A. Gossard.
The two species of peach borers in the Lake Erie fruit district. Life history studies
and control measures. Codling worm and lesser apple worm in same district.
J. L. King.

Clover leaf roller. Life history and control measures. — H. A. Gossard.
Grape berry worm. Life history and control measures. — W. H. Goodwin.

Tennessee, Knoxville. — E. C. Cotton.
Peach tree borer.

Utah, Logan. — E. G. Titus.
Life history of the codling moth.

Washington, Pullman. — A. L. Melander.
Vanessa californica.

This insect appeared in excessive numbers last season from British Columbia
to California.

Investigations dealing with Diptera

Canada, Guelph. — Lawson Caesar.
Life history, distribution and control of the apple maggot, *Rhagoletis pomonella*.
Almost completed.

Life history, distribution and control of the cherry fruit flies, *Rhagoletis cingulata* and
R. fausta.
Almost completed.

Connecticut, Storrs. — G. H. Lamson.
The use of hogs in controlling the apple maggot.

Connecticut, New Haven. — W. E. Britton.
The control of the mosquito nuisance in Connecticut and the effect of drainage on
the salt marsh flora and yield.
Some progress has been made, but observations must necessarily extend over
a period of several years.

Control of cabbage maggot.
Field tests have been made and will be continued.

Indiana, Lafayette. — James Troop.
The life history of the Hessian fly in northern, central and southern Indiana.

Illinois, Urbana,—S. A. Forbes.

The occurrence and life history of the black flies of Illinois with particular reference to the possibility of these insects serving as agents in the transmission of pellagra.

Kansas, Manhattan,—Geo. A. Dean.

Life history and measures of controlling the Hessian fly. Geo. A. Dean and J. W. McColloch.

Massachusetts, Amherst,—H. T. Fernald.

Methods for the control of onion maggot on large fields.

Progress satisfactory.

Minnesota, St. Anthony Park,—F. L. Washburn.

Problems in connection with the Muscoid flies, *Simuliidae* and *Culicidae*.

C. W. Howard in immediate charge.

The wheat stem maggot, *Meromyza americana*, C. W. Howard and Warren William-son in immediate charge.

New Hampshire, Durham,—W. C. O'Kane, C. H. Hadley, Jr.

The apple maggot.

Will be published this winter.

The control of root maggots by the use of insecticides.

Two seasons of preliminary work completed.

The control of black flies, deer flies and midges.

In progress.

New York, Albany,—E. P. Felt.

A monographic study of the biology and the taxonomy of the gall midges.

Well along, largely in manuscript.

New York, Geneva,—P. J. Parrott.

The life history, habits and means of controlling the grape midge. F. Z. Hartzell in immediate charge.

Life history and habits of the Hessian fly (in cooperation with the U. S. Bureau of Entomology).

The life history, habits and methods of control of the cabbage maggot. This involves a special study of the reaction of the puparia to heat and desiccation, and of the methods of protecting seed beds.

Ohio, Wooster,—H. A. Gossard.

Various species of onion maggots. Control measures. J. S. Houser.

Peru, S. A., Lima,—Charles H. T. Townsend.

Muscoid fly reproduction investigations.

A very considerable amount of muscoid dissection work has been accomplished, including male as well as female reproductive systems and important results have thereby been secured, which will be published in due course.

Washington, Pullman,—A. L. Melander.

Habits and methods of control of root maggots.

Naphthalene was found to give protection.

Wisconsin, Madison,—J. G. Sanders.

The onion maggot and its control.

Other onion insects are being investigated along with this work.

Investigations dealing with Coleoptera

Alabama, Auburn,—W. E. Hinds.

The life history and control of the rice or black weevil, *Calandra oryza*.

Substantial progress.

Arizona, Phoenix,—A. W. Morrill.

Experiments in the control by means of arsenicals of the "corrupted lady bird" on beans, *Epilachna corrupta*.

Comparative life history studies at different elevations within the range of the insect added to the original plan.

Green fruit beetle (*Altorthina mutabilis*) life history, habits and control.

Good progress with studies of life history and habits. Satisfactory control methods not yet demonstrated.

Arkansas, Fayetteville,—George G. Becker.

Life history, habits and methods of control of *Saperda candida*.

This is really two projects: (1) life history and habits, (2) the measures of control. Substantial progress.

Australia, Brisbane, Queensland,—A. A. Girault.

Investigations of the sugar cane grubs (Scarabaeids in general) of Australia.

Colorado, Fort Collins,—C. P. Gillette.

The life history and practicable means of controlling *Epilachna corrupta* Muls.

S. Arthur Johnson in immediate charge.

Connecticut, New Haven,—W. E. Britton.

The life history, damage and control of the white pine weevil in Connecticut.

A beginning made. Studies must reach over a period of several years.

Illinois, Urbana,—S. A. Forbes.

Life history of the species of *Lachnosterna* (white grubs), the conditions bringing on outbreaks, and the practical use of insect and plant parasites in their control.

Louisiana, Baton Rouge,—E. S. Tucker.

A study of *Diabrotica 12-punctata*, particularly in the larval stage, when it is called the southern corn rootworm or drillworm.

The object is to learn particulars that will be an addition to our knowledge of the species. Through complaints of damaged potato tubers, a new habit of the larva has been discovered which makes it an enemy of the potato crops in our wet lands.

Massachusetts, Amherst,—H. T. Fernald.

Methods for the control of wireworms. Completed.

Minnesota, St. Anthony Park,—O. G. Babcock.

Corn bill bug.

Missouri, Columbia,—Leonard Haseman.

The hickory twig girdler. Ready to report.

The striped cucumber beetle. Just begun.

The clover leaf weevil. Just begun.

Elm tree borer. T. J. Talbert and L. Haseman in charge. Work just begun.

Montana, Bozeman, —R. A. Cooley.
Life history and control of the sugar beet silplid (*Silpha bilaberosa*).

New Mexico, State College, —D. E. Merrill.
Bean lady beetle (*Epilachna coarctata*).

Experiments to find strength of arsenical and kind to be effective and not injure foliage.

New York, Geneva, —P. J. Parrott.
The life history and methods of controlling the rose chafer. F. Z. Hartzell in immediate charge.
The life history, habits and methods of controlling the grape root worm. F. Z. Hartzell in immediate charge.

North Carolina, Raleigh, —Franklin Sherman, Jr.
Potato flea-beetle and control. —C. L. Metcalf, Assistant.

Spraying tests to control this, along with other potato insects and diseases, with observations on (a) effect on flea-beetle injuries, —(b) effect on yield. Begun this year, —will continue.

North Carolina, West Raleigh, —Z. P. Metcalf.
Biological investigations of *Sphenophorus callosus* and other injurious members of this genus occurring in North Carolina.
Practically completed.

An investigation of the life history and methods of control of the cow pea weevil, *Pachymerus chinensis* L.

Ohio, Wooster, —H. A. Gossard.
Bark beetles. Life history and control studies. H. A. Gossard and J. L. King.
White grubs. Control measures. H. A. Gossard and J. S. Houser.
Various species affecting stored grains and products. Control measures. W. H. Goodwin.
Life history studies of *Balaninus* or nut weevils. W. H. Goodwin.

Oregon, Corvallis, —H. F. Wilson.
The *Scolytidae* infesting the Douglas fir.

Utah, Logan, —E. G. Titus.
The life history of the alfalfa weevil.

Virginia, Norfolk, —T. C. Johnson.
The bean weevil. }
The Colorado potato beetle. } F. H. Chittenden in immediate charge.

Washington, Pullman, —A. L. Melander.
Distribution and control of the Colorado potato beetle.
This new-comer to Washington is spreading rapidly.
Taxonomy of the *Agronyzidae*. Published in Jour. N. Y. Ent. Soc.

Investigations dealing with Hymenoptera

Arizona, Phoenix, —A. W. Merrill.
Ant control, *Pogonomyrmex barbata*
Additional work planned—satisfactory conclusions not reached.
Control of alfalfa seed chalcis fly (*Brucophagus funebris*).
Preliminary field experiments unsatisfactory but give a useful basis for future work.

Colorado, University of, Boulder,—T. D. A. Cockerell.
Bees (*Apodea*) of the world.

Illinois, Urbana,—A. D. MacGillivray.
The classification of the larvæ of the *Tenthredinoidea*.

Iowa, Ames,—R. L. Webster.
Two species of strawberry slugs, *Empria maculata* and *Empria* sp.
Investigations practically completed.

Maryland, College Park,—A. B. Gahan.
Classification and host relations of the *Braconidae*, sub-family *Opiinae*.

Massachusetts, East Warcham,—H. J. Franklin.
Bumblebees.
Monograph on bumblebees of the New World published.

Minnesota, St. Anthony Park,—F. L. Washburn.
Clover-seed chalcid, *Brucophagus funebris*. Warren Williamson in immediate charge.
Larch saw fly. A. G. Ruggles in immediate charge.
Icosoma spp. Warren Williamson in immediate charge.
Minnesota *Hymenoptera*. F. L. Washburn in immediate charge.

Missouri, Columbia,—L. Haseman.
A study of bee keeping in Missouri with special reference to breeding habits. Work just begun.

New York, Geneva,—P. J. Parrott, B. B. Fulton.
Life history, habits and methods of controlling the cherry saw fly leaf miner, *Profenusa collaris* MacG.
Distribution, life history and methods of controlling *Polydrosus impressifrons*.
W. J. Schoene in immediate charge.

Utah, Logan,—E. G. Titus.
The life history of the wheat straw worm.

Washington, Pullman,—A. L. Melander.
Effects of endoparasitic Hymenoptera on the host insect. A histologic study.

Wisconsin, Madison,—J. G. Sanders.
Wisconsin bee-keeping conditions.

Investigations dealing with groups of insects or with insecticides or with both

Alabama, Auburn,—W. E. Hinds.
Carbon bisulphide and hydrocyanic acid gas as insecticides.
Substantial progress.

An investigation of the factors affecting the distribution, adhesion, economy of application and insecticidal efficiency of arsenical insecticides with particular reference to arsenate of lead in its various forms.

In a general way results so far show that there is apparently a considerable shedding of fruit on sprayed trees due to arsenical effect and not to any insect injury. Further work will be done along this line and it is believed that it will develop something of material value for the consideration of orchard sprayers

and possibly for all users of arsenical insecticides. It is hoped through this project to be able to standardize arsenate of lead both for the manufacturer and for the sprayer.

California, Stanford University,—V. L. Kellogg.

The influence of age of sperm and egg cells on sex of young in silkworms.

Seven hundred and fifty controlled matings made; egg clutches awaiting rearing.

Colorado, Fort Collins,—C. P. Gillette.

Insect control through treatment of their eggs.

Colorado, University of, Boulder,—Theo. D. A. Cockerell.

Insect fauna of Colorado.

Fossil insects.

Connecticut, New Haven,—W. E. Britton.

Insects attacking vegetable crops in Connecticut.

Insects attacking the white pine in Connecticut.

Insects attacking peach in Connecticut.

Connecticut, Storrs,—G. H. Lamson.

Insects that attack cucurbits.

Insects that attack peach.

Iowa, Ames,—R. L. Webster.

Potato insects. Investigations practically completed.

Kansas, Manhattan,—Geo. A. Dean.

Relation of climate to injurious insects, Geo. A. Dean and J. W. McColloch.

Measures of controlling mill and stored grain insects, Geo. A. Dean.

Louisiana, Baton Rouge,—E. S. Tucker.

Insects affecting stored rice.

Progress has been made in determining the life history of the principal species and their resistance to fumigating agents under warehouse conditions.

Massachusetts, Amherst,—H. T. Fernald.

A study of the causes producing the burning of foliage by insecticides. Progress satisfactory.

Investigations of the real amount of benefit obtained by the work of the different groups of parasites. Progress satisfactory.

Distribution limits of pests in Massachusetts. Progress satisfactory.

Strength of fumigation safe on different greenhouse crops as compared with strength necessary for destruction of the pests. Temporarily discontinued. Will be resumed fall of 1914.

Massachusetts, East Wareham,—H. J. Franklin.

Cranberry insects (injurious and beneficial).

Progress fully reported in last three annual reports of the Cape Cod Cranberry Growers' Association, and in the last two annual reports of Massachusetts Agricultural Experiment Station.

Michigan, East Lansing,—R. H. Pettit.
How contact insecticides kill. E. G. Shafer in immediate charge.
The life histories and control of various fruit and field crop insects.
The life histories and control of insects injurious to Michigan forests.

Minnesota, St. Anthony Park,—F. L. Washburn.
Shade tree pests. A. G. Ruggles in immediate charge.

Mississippi, Agricultural College,—R. W. Harned.
Insects affecting pecans (mainly life history studies). Some progress.

Missouri, Columbia,—L. Haseman.
The insect pests attacking nursery stock in Missouri. T. J. Talbot in charge.
This work is just begun, and will extend over a series of years.

Nebraska, Lincoln,—Myron H. Swenck.
The rôle of insects in tripping alfalfa blossoms and the subsequent effect of such tripping on the size of the seed crop.

Progress satisfactory. Preliminary publication contemplated.
A monographic account of the insect enemies of alfalfa. Progress satisfactory.

New Hampshire, Durham,—W. C. O'Kane, C. H. Hadley, Jr.
Insect outbreaks.
A determination of the amount of arsenic left on fruit, foliage and grass following application of sprays. Substantial progress.
Distribution and food plants of New Hampshire insects. Conducted as continuous work.
Dust spraying. Comparative efficiency and cost of dry and wet applications.

New York, Albany,—E. P. Felt.
Shade and forest tree insects.
Numerous insects belonging in this group have been studied and reported upon each year.
The effect of applications of petroleum or petroleum compounds to dormant trees.
This investigation has extended over three years and some very conclusive data secured.

Factors influencing the distribution and abundance of insects.
Considerable data have been accumulated though not much has been published except incidentally with other studies.

New York, Cornell University, Ithaca,—Glenn W. Herriek.
Insects injurious to hops in New York. I. M. Hawley in charge.
The work has just been begun.

North Carolina, Raleigh,—Franklin Sherman, Jr.
Pecan insects, C. L. Metcalf, Assistant.
A study of the species affecting this tree, with observations on habits, life-histories, and control measures of those that are serious. Begun this year.

Ohio, Wooster,—H. A. Gossard.
Insects affecting stored grains and stored products with methods of control. W. H. Goodwin.
Insects affecting shade and ornamental trees with questions relating to organization of city and park treatment from standpoint of economy—in other words, best methods of municipal control. J. S. Houser.

Control of insects affecting live stock. D. C. Mote (Dept. Animal Husbandry in cooperation with Dept. Entomology).

Moisture as a factor in treatment of insects by the heat method. W. H. Goodwin.

The time factor in treatment of summer insects. In connection with preparation of Summer Manual of Practice in Economic Zoology. H. A. Gossard.

Spraying machinery and accessories. W. H. Goodwin.

Oregon, Corvallis,—H. F. Wilson.

Investigations of insecticides and combination sprays.

This includes lime-sulphur, arsenate of lead, arsenite of zinc, soluble sulphur, atomic sulphur, etc., and a few miscellaneous investigations of minor importance.

Pennsylvania, Harrisburg,—H. A. Surface.

Susceptibility of varieties of cultivated plants, especially fruits, to insect and plant-disease injury.

Improvement of the lime-sulphur solution.

Prevention of peach tree borer and certain other orchard pests.

Peru, S. A., Lima,—Charles H. T. Townsend.

Transmission of verruga by bloodsuckers.

These investigations have been carried on by the entomologist personally, assisted by Mr. E. W. Rust, from May to July and by Mr. G. E. Nicholson since July. The result is the complete demonstration, through transmission experiments, of *Phlebotomus verrucarum* Towns, as the vector of verruga. About 50 species of blood-suckers have been found to exist in the verruga zones so far, of which the *Phlebotomus* proves to be the only strictly nocturnal and crepuscular species confined to these zones. The other species are being worked up by specialists. The early stages of the *Phlebotomus* have not yet been found, despite repeated search.

Porto Rico, Rio Piedras,—

General entomological survey of the sugar cane areas of Porto Rico.

Outlined in last year's report.

General breeding work.

Laboratory and office work.

Field work.

Experimental work. Outlined in last year's report.

Utah, Logan,—E. G. Titus.

Arsenical poisoning of fruit trees.

West Virginia, Morgantown,—W. E. Rumsey.

The control of the apple and peach tree borers.

Progress satisfactory.

Washington, Pullman,—A. L. Melander.

Effect of oil sprays on fruit trees.

Taxonomic Directory

Thysanoptera.

W. E. Hinds, Auburn, Ala., will classify for privilege of retaining duplicates and of naming and describing the new species.

Mallophaga and *Anoplura*.

V. L. Kellogg, Stanford University, Cal., will classify collections (under reservation

as to available time) for usual privileges; especially glad to examine material from mammals.

Orthoptera.

R. A. Cooley, Bozeman, Mont., will classify *Orthoptera* of the Northwest.

B. H. Walden, New Haven, Conn., will classify, in so far as other work will permit.

Membracidae, Jassidae, Cercopidae and Fulgoridae.

Z. P. Metcalf, West Raleigh, N. C., will classify for permission to retain new and unusual forms for further study, and to dispose of a fair number of such forms as he may see fit.

Jassidae.

E. D. Ball, Logan, Utah, will classify North American forms under the usual conditions.

Aphididae.

C. P. Gillette, Fort Collins, Colo., will classify, provided data on food plants and date and location of capture are furnished, and the privilege of retaining the specimens of special interest when there are duplicates.

H. F. Wilson, Corvallis, Oregon, will classify *Aphididae* if data on food plants, dates and location of capture are furnished. The correct scientific name of the food plant should be given.

Aphididae and Psyllidae.

Edith M. Pateh, Orono, Maine, will classify on receipt of mature material in good condition with record of food plant accurately determined on which the species developed.

Aleyrodidae.

J. R. Watson, Gainesville, Fla.

Coccidae and Aleyrodidae.

W. E. Britton, New Haven, Conn., will classify in so far as other work will permit.

Coccidae.

J. G. Sanders, Madison, Wis., will classify species of the genus *Lecanium*.

R. A. Cooley, Bozeman, Mont., will classify the genera *Chionaspis*, *Hemichionaspis* and *Phenacaspis* of the world.

R. H. Pettit, East Lansing, Mich., will classify in so far as other work will permit.

Heteroptera.

Paul S. Welch, Manhattan, Kansas, will classify, in so far as other work will permit, Aquatic *Heteroptera*.

Sarcophagidae of the Northeastern U. S., *Trypetidae*, if sent before May 1, 1914.

H. T. Fernald, Amherst, Mass., will classify.

Chironomidae and Mycetophilidae.

O. A. Johannsen, Cornell University, Ithaca, N. Y., will classify for the privilege of retaining desiderata.

Muscoid flies.

Charles H. T. Townsend, Lima, Peru, S. A., will classify as time permits. Will send names in return for specimens.

Empididae.

A. L. Melander, Pullman, Wash. (at the Bussey Institution, Forest Hills, Boston, Mass., until June), will determine *Empididae* (Diptera) for the privilege of retaining desiderata.

Syrphidae.

A. L. Lovett, Corvallis, Oregon, will determine if duplicates are sent.

Ionidae.

E. P. Felt, State Museum, Albany, N. Y., will classify provided the midges are new, from new localities or have been reared and food record is available.

Megastigmus.

C. R. Crosby, Cornell University, Ithaca, N. Y.

Chalcidoidea.

A. A. Girault, Brisbane, Queensland, Australia, will classify.

Bombidae.

H. J. Franklin, East Wareham, Mass., will classify to limit of his spare time.

Tenthredinidae and Uroceridae.

A. D. MacGillivray, 603 W. Michigan Ave., Urbana, Ill., will classify in so far as other work will permit for permission to retain types and specimens not present in collection.

Aphidiinae and Opiinae, sub-families of *Braconidae*.

A. B. Gahan, College Park, Md., will classify on condition that specimens may be retained if desired.

Sphecidae, *Elidinae*, *Aporinae*, genus *Ichneumon* of N. E.; also genus *Xylocopa* if sent before May 1, 1914.

H. T. Fernald, Amherst, Mass., will classify.

Ichneumonidae.

J. H. Merrill, Manhattan, Kansas, will classify, in so far as other work will permit, *Rhyssides* of the *Ichneumonidae*.

Apoidea.

E. G. Titus, Logan, Utah. For permission to retain types and specimens not present in his collection.

Myron H. Swenk, Lincoln, Neb., will classify members of this group from Nebraska, and any North American member of the following genera—*Colletes*, *Nomada* and *Anthidium*.

Nymphulinae.

Paul S. Welch, Manhattan, Kansas, will classify in so far as other work will permit, the family *Nymphulinae*.

By vote of the Association the report was received.

PRESIDENT P. J. PARROTT: The next order of business will be the report of the Committee on Incorporation, by Mr. E. P. Felt.

REPORT OF COMMITTEE ON INCORPORATION

Acting under the authorization given the committee at the last annual meeting, the Association has been incorporated as shown by the following articles of incorporation:

ARTICLES OF INCORPORATION

CITY OF WASHINGTON, DISTRICT OF COLUMBIA:

We, the undersigned

P. J. Parrott, Geneva, N. Y.

W. D. Hunter, Washington, D. C.,

A. L. Quaintance, Washington, D. C.

being persons of full age and citizens of the United States, and a majority being citizens of the District of Columbia, pursuant to and in conformity with Sections 599-604 of the Code of Law for the District of Columbia, enacted by the Senate and House of Representatives of the United States of America in Congress assembled and approved March 3, 1901, hereby associate ourselves together as a body corporate, and certify in writing:

1. That the name of the body corporate is the AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

2. That the term for which the Association is organized is perpetual.

3. That the particular business and objects of the Association are to promote the science of economic entomology, to stimulate and coordinate the efforts of AMERICAN ENTOMOLOGISTS and (1) to discuss new discoveries, to exchange experiences, and to carefully consider and promote the best methods of work in economic entomology; (2) to give opportunity to individual workers of announcing proposed investigations so as to bring out suggestions and avoid unnecessary duplication of work; (3) to suggest and encourage, when possible, certain lines of investigation upon subjects of general interest within the scope of this association; (4) to promote the study and advance the science of entomology and (5) to publish and encourage the publication of matter pertaining to entomology.

4. That the affairs, funds and property of the Association shall be in general charge of an executive committee consisting of the President, three Vice-Presidents and the Secretary-Treasurer, all of whom shall be elected from members of the Association.

Witness our hands and seals,

WITNESS:

E. PORTER FELT
as to all

PERCIVAL J. PARROTT (Seal)

WALTER D. HUNTER (Seal)

ALTUS L. QUAINANCE (Seal)

DISTRICT OF COLUMBIA, ss:

I, W. Spencer Armstrong, a Notary Public, in and for the District of Columbia, do hereby certify that Percival J. Parrott, Walter D. Hunter and Altus L. Quaintance, personally well known to be the persons who signed the foregoing and annexed certificate of incorporation of the AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS, personally appeared before me in said District, this 29th day of December, 1913, and acknowledged the same to be their act and deed.

WITNESS my hand and seal this 29th day of December, 1913.

W. SPENCER ARMSTRONG,
Notary Public, Dist. of Col.

(NOTARIAL SEAL.)

Office of Recorder of Deeds,
District of Columbia.

THIS IS TO CERTIFY that the foregoing is a true and verified copy of the Certificate of Incorporation of the AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS as filed in this office the 29th day of December, 1913.

IN TESTIMONY WHEREOF, I have herunto set my hand and affixed the seal of this office this 29th day of December, A. D. 1913.

R. W. DUTTON,
Deputy Recorder of Deeds, D.C.

(RECORDER'S SEAL)

A tentative organization was formed at Washington and the following business transacted:

MINUTES OF PRELIMINARY MEETING

A meeting was held at Washington, D. C., December 29, 1913, by Messrs. Parrott, Hunter and Quaintance, signers of the Articles of Incorporation of the American Association of Economic Entomologists, Incorporated.

A temporary organization was effected with A. L. Quaintance, Chairman, and P. J. Parrott, Secretary.

Moved, that the constitution and by-laws with pending amendments, of the American Association of Economic Entomologists as now standing, be adopted. Carried.

Moved, that the present members of the American Association of Economic Entomologists be elected members of the corporation with their present rights and privileges. Carried.

Moved that the meeting adjourn, to assemble at Atlanta, Ga., December 31, 1913.

P. J. PARROTT, *Secretary*.

The committee would call attention to the fact that as a membership corporation we may hold and convey real and personal estate necessary for the purposes of the society as stated in the certificate and other real and personal property, the clear annual income from which shall not exceed in value twenty-five thousand dollars.

Respectfully submitted

E. P. FELT,
A. F. BURGESS,
W. C. O'KANE,
Committee.

PRESIDENT P. J. PARROTT: I am sure that the Association is very much indebted to Doctor Felt for the time and careful attention he has given to this matter and especially for the favorable terms and conditions under which the incorporation was affected. This is a very important matter and it would seem proper to me to discuss the report at this time.

MR. GLENN W. HERRICK: Under this incorporation what is the liability of each member of the Association? I would like to hear that discussed.

MR. E. P. FELT: I don't know that I can answer that fully. A membership corporation does not give as much protection to the

members as a stock corporation, but we were unable to find any state where we could secure incorporation as a stock company without being obliged to have a resident director or hold annual meetings there, or be subject to other restrictions, and it seemed desirable for us to incorporate as a national organization. In regard to the liability of individual members, the legal adviser of the Department of Education at Albany, N. Y., told me that in general the officers of a membership corporation were liable for bills incurred and the members were liable to the officers so far as the officers were able to enforce the same. This is not very definite, but it simply emphasizes the need of putting in office parties who will not involve the membership too deeply. Although this is not an ideal form of incorporation, it seemed to be the most satisfactory solution to the problem. It gives us a legal standing and we can go ahead and do business on a much more satisfactory basis than we could before.

SECRETARY A. F. BURGESS: Doctor Felt did not bring out the point that under this form of corporation we can hold meetings anywhere and at any time without restriction and we are not bound to hold meetings in the District of Columbia unless we care to do so.

PRESIDENT P. J. PARROTT: I would suggest that Doctor Felt give us a statement of the advantages which will be secured to the Association as an incorporated body.

MR. E. P. FELT: The fact of being a corporate body establishes a legal entity and as such we can do business and are entitled to hold property and to have a seal. Any business transacted under this seal represents the act of the body corporate and not that of any individual. This is the principal advantage. We can hold and convey real estate, and as stated in the latter part of the report, we are limited to holding estate or property not necessary for the purposes of the organization, which has an income of less than \$25,000 a year. Incorporation is a financial protection to the managers of the publication. If anything should be published in the JOURNAL which would be subject for legal action it would relieve the officers to some extent, at least, from personal responsibility.

MR. WILMON NEWELL: I know some of the difficulties that have been in the way of conducting business of the Association for the past few years, and I think we owe Doctor Felt and his associates many thanks for what they have accomplished. It certainly puts the Association in much better shape than ever before and I move that this report be accepted and adopted.

This motion was duly seconded and carried.

PRESIDENT P. J. PARROTT: I will now appoint the following committees:

COMMITTEE ON AUDITING: Mr. J. G. Sanders, Mr. E. C. Cotton.

COMMITTEE ON RESOLUTIONS: Mr. Herbert Osborn, Mr. G. A. Dean, Mr. Wilmon Newell.

COMMITTEE ON NOMINATIONS: Mr. W. D. Hunter, Mr. F. L. Washburn, Mr. R. A. Cooley.

PRESIDENT P. J. PARROTT: Is there anything to be considered under the head of miscellaneous business?

SECRETARY A. F. BURGESS: I would like to say a word in regard to the program. The announcement of the meeting was sent out with a request that titles be in my hands November 12. A considerable number of titles came in late, and as far as possible they have been inserted in the printed program. Much difficulty was experienced in preparing the program so that the JOURNAL could be issued before the middle of December, and it was necessary to add a number of titles to the proof before it was returned to the printer. After the program was in press a number of other titles were received, and as our program is not as crowded as usual, it may be possible for some of these papers to be added before the end of the meeting.

On motion the secretary was directed to use his discretion in inserting these papers in the printed program.

PRESIDENT P. J. PARROTT: I will now call for the report by the Committee on Nomenclature.

MR. HERBERT OSBORN: The committee has no formal report to make this year. We have received no requests concerning nomenclature and we will simply ask that the matter be passed without formal report.

By general consent the statement from the committee was received.

PRESIDENT P. J. PARROTT: I will now call for the report of the Committee on the use of Entomological Publications, by Mr. F. L. Washburn.

REPORT OF THE COMMITTEE ON EFFICIENCY OF ENTOMOLOGICAL PUBLICATIONS

Owing to the distance separating the members of the committee appointed at the last meeting to ascertain the use made by farmers of entomological bulletins, and the relation between the arrangement of bulletin contents and their acceptability to agricultural constituencies, we beg leave to report that it has been impossible for the committee to meet and, therefore, we adopted the plan of conferring by mail, each advising the other members of his program of action, so that each might benefit thereby; and, since conference of the committee at the meeting has also turned out to be an impossibility, we have arranged that each shall report separately upon the information collected, with such comments and recommendations as he feels is warranted. Such a method will, at least, possess the merit of furnishing an untrammelled and unmodified expression of the views of each and it seems to us that definite expression of opinion, or recommendation, by the Association, as to the best form of writing

bulletins, can originate as well and perhaps better, in the Association itself, after a consideration and discussion of our respective reports, than from the committee. You will, therefore, please regard our respective comments and recommendations as individual opinions, entitled to as much, and, perhaps, to very little, if any more, consideration than the opinions of any other three members of the Association; for while we have faithfully endeavored to execute the commission given to us, the practical difficulties of getting the information desired has precluded the possibility of reaching very definite conclusions. Therefore, respectively submitting such information as we were able to collect, and claiming our right to be listened to as individuals in discussing the same, we beg the privilege of throwing the questions pertaining thereto before the Association without any recommendations as a committee.

H. A. GOSSARD,
R. L. WOOSTER,
F. L. WASHBURN,
Committee.

REPORT FROM OHIO

I have utilized three different methods for getting the information desired by the Association as to the acceptability of Station entomological publications. Assuming that the publications of the Ohio Station may be taken as fairly representative of American entomological publications in general, the data I have collected may possess some little significance; but, each member must decide for himself as to what particular merits or demerits of our publications gain acceptability or unpopularity for them, as he conceives them to rise above or fall below the average standard attained by other institutions.

The first method employed by me to ascertain the attitude of an average farming community was to utilize the services of the Ohio Rural Survey and have a house-to-house canvass made over Knox County, Ohio, the Surveyors making use of the following registration blank:—

Township?..... County?.....
Name?..... Address?.....

(Mr. H. A. Gossard, entomologist of the Ohio Agricultural Experiment Station at Wooster asks that we get answers to the following questions. The questions as you see we use for house-to-house work. I should think if five farmers in a township were interviewed, it would be satisfactory. [NOTE BY SUPERINTENDENT OF SURVEY.])

1. Do you read the entomological bulletins of the Experiment Station?
2. Do you preserve them for reference? Do you refer to them as occasion demands?
3. How could these bulletins be improved so as to be more usable?
 - a. By a different arrangement of matter?
 - b. By more illustrations?
 - c. In any other way?

I have no means of knowing how the five farmers per township were selected, as I gave no instructions concerning the method, and did not know until I received the reports that any farmers whatever were being omitted from interview. I presume, therefore, that the farmers were taken at random and that their returns are fairly representative of what would have been obtained from almost any fairly good agricultural locality in the state.

Number of farmers interviewed, 56; number receiving the Station bulletins, 35; not on the mailing list, 21. Out of the 35 on the mailing list, 33 read the entomological bulletins and two do not. Out of the 33 readers, 23 file them for reference, and 22 report that they actually use them as references from time to time. Eleven do

not file them at all, and one of those who does neglects to make any further use of them. Another files away only the ones he thinks he may need in the future. Fifteen are agreed that the bulletins cannot be improved or made more readable by a different arrangement of the subject matter, against three who say the contrary and one who questions if such improvement could not be made. Fourteen think they are amply illustrated, against two who want more pictures and one who is still questioning if we can't do better. Fourteen know of no way by which they can be improved, while one does, and our previous questioner still answers with an interrogation point. The following comments were noted on the blanks: "Fine"; "Very good"; "Make more practical"; "Very good now"; "Very good"; "Pretty good as now exist"; "Think good as stand."

My second method was to send out 150 copies of the following letter (given in part below), 50 to names taken at random from the roll of the Ohio State Horticultural Society, 50 taken at random from the roll of the Ohio Corn Breeders' Association, and 50 taken at random from the Station mailing list.

EXCERPT FROM CIRCULAR

"1. Please put a pencil check mark after each of the bulletins in the list hereto appended which you have received during the past six years.

2. Put a second pencil check mark after those you have read throughout.

3. Put a third pencil check mark after those that you have partially read by summary or by skimming through to get the main points.

4. Put a fourth pencil check mark after those numbers you have preserved and still have possession of in your library.

Bulletin 191 Spraying apples.

" 194 The more important insects affecting Ohio shade trees.

" 197 The catalpa midge.

" 198 Spring manual of practice in Economic Zoology.

" 202 Raspberry Byturus.

" 216 Spraying machinery.

" 226 The wheat jointworm.

" 232 Spray calendar.

" 233 Fall manual of practice in Economic Zoology.

" 234 Flour mill fumigation.

" 248 Spraying machinery accessories.

" 250 Some Ohio birds.

" 253 Insect pests of the household.

Circular 95 Apple spraying in 1908.

" 112 Commercial apple orcharding in Ohio.

" 115 The Chinch Bug.

" 137 Grasshoppers.

5. Are our bulletins sufficiently illustrated with photographs and drawings?

6. Please state briefly on the back of this sheet what you think would most help to make our bulletins readable."

The last 50 names used were doubtless of about the same average quality as those of the 56 men interviewed by the Rural Survey, but the first hundred were undoubtedly of a higher average quality, and represented, to a considerable extent, the leadership in Ohio agriculture. At first, I was inclined to suppose that the 80 persons who did not answer my letter were very likely more careless and indifferent than those who did answer, and that if I had heard from all, a much smaller percentage of readers of our bulletins would have been recorded; and that they were less interested in them in every respect than those who responded. Such a supposition seems hardly warranted after a comparison of the results obtained with those gotten by the Rural Survey; the results of the two studies approaching each other very closely. Indeed, it appears that I am quite fully warranted in concluding that the 70 persons answering were fairly typical of the 80 who did not respond.

THE REPORT BY ITEMS WERE AS FOLLOWS:—

No. of Bulletin	Received	Read throughout	Read partly or by summary	Preserved and in library
191	47	39	4	25
197	20	5	3	7
198	22	14	2	12
202	16	10	1	8
216	45	35	3	22
226	35	23	4	15
232	43	35	16	20
233	28	16	10	11
234	18	4	2	4
248	36	21	4	18
250	45	25	6	30
253	36	22	4	18
* Circular				
95	34	28	1	17
112	44	28	4	23
113	35	24	3	16
137	31	20	3	17

The following gives the titles of bulletins or circulars and remarks, by the present writer:

191. Spraying Apples. Practical bulletin, introducing western methods of spraying. Summary in back end.

197. Catalpa Midge. Bulletin of somewhat technical contents, forms of damage first discussed, then description, then life history and habits. No general summary, but remedies give the important conclusions.

198. Spring Manual of Practice in Economic Zoology. Intended as a reference work but apparently not being used as planned. The whole work is a summary constructed on a distinctive plan of its own, and could not be modified to any other plan without losing its individuality.

202. The Raspberry Byturus. First calls attention to damage, then to distribution, description, life history and remedies. No summary, but the important conclusion is stated in paragraph giving remedies.

216. Spraying Machinery. A rural engineering bulletin that has been exceedingly useful as an aid to practical entomology. Every paragraph is a summary and as very little had been published on this subject, we were compelled to let the plan of the bulletin be the outgrowth of work with the specimens handled.

226. The Wheat Jointworm. Discussion of damage first, then life history and descriptive matter intermixed, recommendations at end, no general summary.

232. Spray Calendar.

233. Fall Manual of Practice in Economic Zoology. Intended as a reference work and seems to be used in the proper way.

234. Flour Mill Fumigation. A smaller edition than usual, and not sent to all the mailing list. A brief summary at conclusion.

248. Spraying Machinery Accessories. Another rural engineering bulletin, each paragraph of which is itself a summary and summarizing cannot go further. Probably the plan is as good or better than any other would be.

250. Some Ohio Birds. Written especially from the economic standpoint. Summarizing here and there throughout, but no general summary possible.

253. Insect pests of the Household. Each article is a summary of the most

important facts known about each insect. The general plan is quite similar to that used for most bulletins on this subject.

Circular 95. A circular setting forth some rather striking spraying results in an Ohio apple orchard.

Circular 112. Commercial Apple Orchard in Ohio. Summary of commercial results obtained in a number of Ohio apple orchards through a period of several consecutive years.

Circular 115. The Chinch Bug. An emergency publication issued during a summer of uncommon outbreak.

Circular 137. Grasshoppers. Descriptive of hopper-dozer and discusses results with same and criddle mixture in case of a local outbreak.

Twenty-nine thought the bulletins sufficiently illustrated with photographs and drawings against six who disagreed. Some of the remarks made in this connection were as follows: "Not all of them"; "Ample so"; "Very satisfactory"; "I believe so"; "Some are, others not"; "I think most of them are." Four said, "I think so"; Others, "Hardly; illustrations are always most acceptable"; "I think so, but better too many than too few"; "For the average person, you could well further illustrate"; and a number of others made remarks of similar tenor.

Six emphasized the importance of the summary, four of them expressing a preference to have it in the front of the bulletin, while one believed it best to put it in the back, because otherwise it encouraged omitting to read the body-contents.

Various suggestions were made on the backs of the letters, most of which, we supposed we had observed in the preparation of the bulletins, and probably could not observe much better if we tried the second time; e.g., one thought each bulletin should carry an index and table of contents in the front, and referred to bulletin 233, the Fall Manual, as an example of defectiveness in this respect. If he received a perfect copy of this bulletin, it has a very copious index which he may have overlooked because of its being in the back. One farmer who said the entomological bulletins were not generally read in his locality, explained why with this sentence: "Wheat, hogs and corn seem to be all the farmers of this locality think about." One said, "Don't send to farmers, bulletins intended chiefly for entomologists and scientists." Most of the answers indicated that the writers were reasonably well satisfied with the bulletins as prepared by us, and a considerable fraction of them were distinctly commendatory. A number were worded very similar to this; "I could offer no suggestions for bettering your bulletins, as they have all proven very interesting and instructive to me by both ends and substance."

The third method by which I hoped to obtain some information as to the comparative popularity of our different bulletins was to ascertain the number of copies of each that had been distributed during the past six years. However, owing to certain changes, I am obliged to rely upon my own knowledge and recollection in regard to the size of the different editions, and I cannot, therefore, be very definite. At no time during the past six years has our regular mailing list been less than 50,000, and it is at present approximately 60,000, so our regular edition for the run of a bulletin is 65,000. This was the number run of bulletins 248, 251, 253 and circular 137, while 70,000 copies of 250, *Some Ohio Birds*, were printed.

There are not more than 1,400 copies of No. 250 on hand, about 2,500 of No. 248 (*Spraying Machinery Accessories*) and something like 800 of No. 251 (*Wheat Leaf Miner*), while the last copy of No. 253 (*Household Insects*) is gone; no full edition of any bulletin has ever been more rapidly exhausted at the Ohio station. Of circulars No. 137 (*Grasshoppers*) 1,500 are left. That, in so many cases, the excess of 5,000 bulletins over the regular mailing list is so quickly absorbed, signifies to us, possibly wrongly, that somebody must want to read them, and so many people would not want

to read them, unless many of those on the regular list were reading them and talking more or less about them. We have been obliged to reprint bulletin No. 191 (Spraying Apples) at least three times, in editions of 2,000 to 5,000 copies each, and several hundred copies are still wanted each year. Bulletin No. 191 (Shade Tree Insects) has been reprinted once, and I think twice. So far as I can recall, Bulletin No. 197 (Catalpa Midge) has not been reprinted. The Spring Manual of Practice, No. 198, has been reprinted three or four times. I think No. 202 (Raspberry Byturus) has not been reprinted. Bulletin No. 216 (Spraying Machinery) has been reprinted at least twice and, perhaps more. The Wheat Jointworm, No. 226, I believe has not been reprinted. The Fall Manual, No. 233, has been reprinted at least once, and possibly twice. Several of our circulars have been reprinted several times. I am assured by our mailing clerks that the entomological publications are called for about as frequently as those from any other of our station departments. The Seasonal Manuals are said by them to be in constant demand in the horticultural districts and by the public schools of the state. By every clue that I have been able to follow, I am led to believe that, in Ohio, the entomological bulletins are quite generally read and esteemed, and that about half of the copies mailed are not destroyed, but, after being read, are filed and kept for reference. I distinctly recall that in practically every case when we have issued an important bulletin, we have received soon thereafter, at least a few letters of appreciation and commendation from the rank and file of our readers, thus showing that they have more than a passing interest in them.

If anyone seeks an explanation of the general acceptability of our publications in any formulated plan of arrangement of the subject matter, he will not find it; for every publication has a plan of its own which differs from every other. If there has existed among entomological writers any written or unwritten canons regarding the arrangement of their matter for print, we are obliged to plead having been so ignorant of them that we must have unconsciously violated them in everything, or nearly everything, we have ever written; and I think many, perhaps most, of present-day entomologists share our ignorance. "We" and "our" in this report refer to the Ohio entomological staff, for whom I am presuming to speak in reference to this subject.

The position taken at our last meeting by Mr. Webster, of this committee, was correct, and, if I mistake not, has been occupied, in effect, by a considerable number of our members for a long time. In my judgment, the arguments that sustain his position will show equally well the futility of any attempt to make a very definite formulation of rules or recommendations as to the best form for bulletins. If the writer possesses the gift of "editorial gumption," his bulletins will likely be read and used, while if he has not acquired it, I am very dubious if the most carefully framed rules for construction will help him much.

To the master-writer, rules, forms, models, examples, precedents, are merely general principles wrought into more or less concrete forms, and his work is guided by the flexible principle, never hampered by the cast-iron rule; while, to the less experienced writer, the model is apt to be regarded as a pattern to be imitated. That each entomologist may be enabled to adapt his writings to the limitations of his constituents, always more or less local, he must be practically unlimited.

In several of the departments at the Ohio Station, lengthy bulletins, containing much technical and tabulated matter, are condensed into short circulars, these going to the complete mailing list, while smaller editions of the complete bulletins are issued and sent to specialists and to such constituents as specially request them. We have adopted this plan in the entomological department.

H. A. GOSSARD.

REPORT FROM IOWA

One hundred and ninety-eight circular letters were sent out December 4, 1913, to names selected at random from the Station mailing list; 100 from the horticultural list, 98 from the general list. An attempt was made to select older names from the list, but some people had not received any entomological bulletins. Although a stamped envelope was enclosed, only 46 replies have been received to date, December 27, 1913.

While it is not wise to place great dependence on so few replies, these are given in substance for what they may be worth.

The questions asked followed closely those used by Prof. H. A. Gossard in Ohio, and were of three kinds: (1) those regarding the bulletins sent out, (2) suggestions for improvement, and (3) regarding essential features and arrangement. A résumé of the replies follows.

(1) The data are best presented in tabular form.

Number of replies	46
Bulletins retained by	31
Bulletins not retained	6
Bulletins not received	9

Of the 31 answers where bulletins were retained, 16 replied definitely as to the amount of attention given individual bulletins. In these, data are given on 40 bulletins received. Eighteen of these were read throughout, 33 read in part, by summary, etc., seven were not read.

In general it appeared that approximately five sixths of the bulletins sent out were retained. Of these about four fifths were read by summary, etc., although some people went further than this, and about one half of the bulletins were read throughout.

(2) Here the question was: What would most help to make our bulletins more readable?

There were many suggestions; a few thought the present form was quite sufficient. The features most often suggested were brevity and simple language. Others wanted timely bulletins, reaching them when the insect was causing damage. Other suggestions were: sure remedies, small bulletins, uniform size and plenty of illustrations. One man thought bulletins ought to be sensational.

(3) Here the hypothetical question put was: Suppose that an insect is bothering the roots of your clover, what are the things you want to know about that insect? Where in a bulletin do you think that information ought to be put?

As expected, the remedy was most desired, according to 18 replies. Only nine asked for a life history. As one expressed it, he wanted to know "where the insect came from, how long it stayed, and where it went to, as well as how to get rid of it."

Some replies, evidently written with more care, indicated that the writer recognized the necessity for making sure of the insect concerned, for six wanted a description of it. One asked for a "careful description of the insect at the stage in which it is harmful, a brief life history, and the remedy."

Only one person wished to know the effect on the plant; one, the favorable and unfavorable conditions affecting the insect.

Now regarding the proper place for the sought-for information. The front part of the bulletin seemed to be the favorite position, but almost as many said it made little difference. One thought the essential information should be placed in the concluding portion at the end. The demand for a summary was general, but with no decided preference for its position, except for a conspicuous one.

Concluding, it appears that a fair proportion of entomological bulletins are read and preserved. There is a demand for brevity and simple language. The essentials are, from the standpoint of the practical man, the remedy, a brief life history, and a recognizable description of the insect.

R. L. WEBSTER.

REPORT FROM MINNESOTA

We have in Minnesota 157,000 farms. Our general mailing list of regular Station bulletins, exclusive of extension bulletins, is distributed among the various Divisions about as follows:

Bulletins upon horticulture and forestry	4,750	addresses
“ “ veterinary science	4,500	“
“ “ animal husbandry	5,500	“
“ “ agronomy and farm management	5,750	“
“ “ agricultural engineering	3,750	“
“ “ entomology	3,750	“
“ “ botany and plant pathology	4,000	“
“ “ chemistry and soils	4,200	“

Many of the above figures represent duplications and the Station bulletin mailing list, exclusive of the Extension Division, is probably in the vicinity of 15,000 names, and practically one-fourth of this number have called for bulletins upon entomology. Since this number was specifically asked for, it is fair to assume that the entomological bulletins are appreciated, though not necessarily thoroughly read.

Turning to another class of literature, more elementary in language, brief, to the point, and severely practical, namely, the Farmers' Library Bulletins, issued by our Agricultural Extension Department, we find there is a mailing list of approximately 40,000 addresses in Minnesota (about 45,000 all told) representing approximately 26 per cent of the farmers in Minnesota. This list naturally includes the regular Station list. Judging from the inquiries amongst recipients, from observations at the State Fair and from the demand, as well as from the nature of the publications, as above indicated, it is safe to conclude that these bulletins are more generally read and understood than those on the regular mailing list, which fact might be regarded as a suggestion for simplicity and directness in the preparation of all of our bulletins intended primarily as aids to the agricultural classes.

The following we obtained from our Bureau of Farm Economics:—Out of 167 farms visited in a cut-over timber country by our men, recently, 26% received our Extension or Station bulletins and, in a farming county of the Red River Valley, out of 203 farms visited, 34% received Station or Extension bulletins,—the latter being in an agricultural district—showing a little rise, as one would expect, over the cut-over district.

In November, 1911, we published a Farmers' Library Bulletin, about 40,000 copies of #23, dealing in a simple and elementary way with some of our most injurious insects and their control. This issue was exhausted long ago, and there is evidently a demand for information in this line, since we have been asked by the Director of the Extension Division to prepare copy for a reprint.

Turning to another class of our constituents, namely, the State Horticultural Society, with its 3,000 odd members, it is safe to say that they make much more intelligent use of our bulletins than the general farmer, and the results secured by Mr. Gossard in Ohio and reported by him would probably be duplicated in Minnesota.

However, under favorable circumstances, it is very evident that, so far as our constituents in the various states are concerned, out of a mailing list of 40,000, not one in 10,000 read everything. Even the better educated of the recipients, while they may glance over our publications casually, seek only what they need, what fits their

individual case, and the remaining information is generally wasted. The evidence we have at hand, points clearly I believe, to definite features which should characterize the construction and use of entomological bulletins. I think I was practically in accord with views expressed by Mr. Webster of this Committee, last year, when I stated in an address given in Washington in December, 1911, that I believed, as a general thing, that "bulletins treating of some destructive insect should contain first a brief popular description of the insect and its work (placing the account of its work first, for the farmers' benefit) using drawings and photos generously; and, secondly, following the above, remedial and preventive methods. All this should be in *bold-faced* type and should be in a form attractive to the eye. Following this, which represents essential points, of course, from the farmers' standpoint, may well come an account of the work in detail in ordinary type, using whatever illustrations are necessary and available;—the more the better, if they are pertinent."

It is evident to me and I believe to most of us that a large per cent of entomological bulletins sent out on the regular Station mailing lists are wasted and represent the misuse of money. To be sure, they convey to the recipients over the state the idea that the Entomological Department is doing something although the hard-headed farmer, in finding the bulletin uninteresting or unattractive, might form a wrong opinion as to the nature of the activity.

Is it not a fact that the best use to which the entomological bulletins are put is in answering questions;—that is, in lieu of writing letters, questions asking specifically for help in connection with some insect; and if this be a fact, does not the situation call for brevity and simplicity of expression and indicate a demand for popular circulars and leaflets rather than lengthy bulletins upon the part of those who would best serve the agricultural classes?

F. L. WASHBURN.

On motion the report was accepted and ordered to be filed with the Secretary.

MR. S. J. HUNTER: I think that some action should be taken on the suggestion made by the Executive Committee concerning the publication of annual notes on insects and I would like to move that it is the sense of the meeting that these notes should be published in the manner indicated in the report.

This motion was seconded and carried.

PRESIDENT P. J. PARROTT: We will now take up the report of the special committee which was appointed to consider the publication of economic literature and which will be given by Mr. W. E. Britton.

REPORT OF COMMITTEE ON CONTINUING THE BIBLIOGRAPHY OF AMERICAN ECONOMIC ENTOMOLOGY

The Bibliography of American Economic Entomology, formerly published by the United States Department of Agriculture, has proved not only extremely useful but almost indispensable to all workers in applied entomology. All regret that it was discontinued. Although the matter was recently considered by the federal authorities, no favorable action has been taken.

As it has been suggested that this Association continue the Bibliography, President Parrott appointed this committee to gather data relating to the subject, for

consideration at this meeting. As it has been a short period of time (only a few weeks) in which to investigate, this report must necessarily be incomplete; yet it is hoped that it may be sufficiently comprehensive to enable you to act intelligently in this important matter.

STATISTICS OF THE BIBLIOGRAPHY

The Bibliography of American Economic Entomology was published in eight parts, altogether containing 1,318 pages, 12,655 citations, and is complete up to January 1, 1905. Since then no indexing has been done.

The Bibliography was printed in 10-point type, the type bed of the page measuring 4½ x 7½ inches in size. Part VIII contained 444 pages, 4,882 citations (or an average of 16½ per page) and there are 41 lines per page. It has an index of 20 pages set in 6-point type.

PLAN FOR CONTINUING THE BIBLIOGRAPHY

In view of the fact that the Bibliography of American Economic Entomology is extremely useful to every applied entomologist; that its special field has not been covered by any subsequent work, and as a consequence almost every economic entomologist is forced to maintain a more or less complete special catalogue (which can be covered more satisfactorily in a general bibliography) and as a result there is throughout the country much undesirable duplication of easily avoided clerical work; this affects not only entomologists throughout the country, but also the workers in the Bureau of Entomology, and owing to the larger force employed there, this compilation will be more useful in the Federal Bureau of Entomology than to any other similar group of entomologists; the members of this committee are most strongly of the opinion that the work should be published by the general government, or, if that be impossible, the citations should at least be assembled and indexed in the Bureau of Entomology.

The committee recommends that if other means fail, the American Association of Economic Entomologists continue this Bibliography; that a carefully selected indexing committee or board be appointed to serve without compensation, to consist of five members, who shall be charged with the preparation of the manuscript.

This committee also recommends that the first issue (Part IX) cover the ten-year period from January 1, 1905, to January 1, 1915; that it be printed in a form similar to earlier numbers and under the direction of the editorial board of the *JOURNAL OF ECONOMIC ENTOMOLOGY*. Such a publication, including text and index, will probably contain not more than 350 pages, and should be sold at such a price that the early sales will about cover the cost of publishing.

PROBABLE COST OF PUBLISHING PART IX

The cost of printing Part IX depends primarily upon the number of citations. Part VIII contains 4,882 citations, or an average of 374 per year, for the five-year period ending January 1, 1905. There has probably been a substantial increase since then, which cannot be accurately estimated, but allowing for 600 per year or a total of 6,000 citations for the ten-year period, the text would contain not more than 200 pages, if set in 10-point type, with two lines for each reference. The index would not make over 40 pages in 6-point type. If there are more than 6,000 references, the book would be larger. If there are only 5,000 references the text will make about 250 pages.

The approximate cost of publishing has been variously estimated at from \$175 to \$550 depending upon the type used. These figures include paper and press work and are based on an edition of 1,000 copies.

PLAN FOR FINANCING THE BIBLIOGRAPHY

As the Association has at present no fund adequate to defray the cost of such a publication, the committee recommends that Part IX be sold to all who desire it, at such a price that the amount obtained from the early sales will nearly cover the cost of the whole edition, leaving the proceeds of later sales to aid in publishing future issues of the Bibliography or similar works. According to the list of 1912, this Association has an American membership (both active and associate) of 328, and 51 foreign members. A good proportion of American members, as well as a few foreign members, will doubtless purchase the Bibliography either for private use or for their department libraries and some will take a copy for each. Many institutions and large libraries will surely purchase one or more copies later.

This committee, therefore, recommends that after the manuscript has been prepared, the Secretary of this Association, through correspondence and by means of advertisements in the *JOURNAL* or elsewhere, obtain advance orders for Part IX of the Bibliography at a price, depending on the cost of publication and upon the number of advance subscriptions, to be fixed later by the editorial board of the *JOURNAL*, which should also be given authority to decide on all details of publishing the Bibliography not otherwise covered by this report.

The members of this committee have known for some time of the manuscript Catalogue of the Described Transformation of American Lepidoptera prepared by Mr. A. N. Candell. We learn that there is no prospect of its being published by the government, and it has been suggested that this also may be undertaken by the Association. The work would comprise about 600 pages and can be printed in an edition of 500 copies for about \$1,200. If this organization would become responsible for the project, this great aid to economic workers could be sold for about \$6 per copy with a very fair prospect that the organization would recoup expenses, or nearly so, with the sale of 200 copies within a year of issue. In view of the great value of the work to our members and the prestige incident to its publication, we believe this a highly desirable line of activity for the Association. We, therefore, recommend that the editorial board be authorized to arrange for its publication if found desirable.

All of which is respectfully submitted:

W. E. BRITTON, *Chairman.*

F. P. FELT,

J. J. DAVIS,

Committee.

MR. W. E. BRITTON. I would recommend that if there is time to discuss this matter it might be well to do so now, but that final action on the report be delayed in order that the members may have an opportunity to consider it thoroughly.

MR. J. M. ALDRICH: Mr. J. J. Davis, a member of this committee was not able to attend this meeting but asked me to say that he was very much in favor of the publication of the bibliography of economic entomology by the Association and I am sure that he would endorse that part of the report if he were present.

MR. W. C. O'KANE: I would like to inquire the reasons for deferring the publication of the bibliography until the completion of the ten-year period, rather than going ahead with it for a five-year period

I believe that there is urgent need of having the bibliography published and I would personally be in favor of having the matter covered by the first five-year period published as soon as possible.

MR. W. E. BRITTON: The only reason is that it is rather more convenient to have the bibliography bound in volumes covering five or ten years, and as it will take a year or more to prepare the matter for publication, we thought that a single volume would cover the ten-year period.

By general consent action on this report was deferred until a later session.

PRESIDENT P. J. PARROTT: An amendment to the constitution has been proposed and is printed in the program. It is necessary that a committee be appointed to consider this matter and report later in the meeting. I will, therefore, appoint the following members to serve on this committee: Mr. W. E. Britton, Mr. Franklin Sherman, Jr., Mr. S. J. Hunter.

PRESIDENT P. J. PARROTT: Is there any further business to be taken up at this time?

SECRETARY A. F. BURGESS: I have a letter from Doctor Howard in regard to the report of the committee on policy of the American Association for the Advancement of Science with reference to the places of holding future meetings, and it seems well to bring this matter up at this time so that the proposed arrangements can be considered at this meeting.

EXTRACTS FROM MINUTES OF COMMITTEE ON POLICY

November 17, 1913.

"A discussion as to the future meetings of the Association was taken up and, on motion, it was resolved to recommend to the next General Committee that Toronto be selected for the convocation week meeting of 1915-1916.

"It was resolved that efforts be made to hold large representative convocation week meetings at four-year intervals, the first to be held in New York in 1916-1917 and the second in Chicago in 1920-1921.

"The Permanent Secretary was ordered to report to the affiliated societies that the Committee on Policy has under consideration the advisability of meeting in 1917-1918 at Columbus, Urbana or Cincinnati, in 1918-1919 at Boston, and in 1919-1920 at St. Louis or Nashville.

"On motion, the Permanent Secretary was instructed to inform the affiliated societies that the Committee on Policy has recommended that efforts be made to hold large convocation week meetings in New York in 1916-1917 and in Chicago in 1920-1921, and to inform the affiliated societies that he has been instructed to forward this information that the societies may plan accordingly."

I might say in connection with this matter that a number of members have suggested to me that this plan provides for no meetings

in the City of Washington. It has also been suggested that as it is the policy of the Association of Agricultural Colleges and Experiment Stations to hold a meeting in Washington, D. C., every other year, that this Association might think it advisable to meet occasionally with the Association of Agricultural Colleges and Experiment Stations in Washington in order to give the Washington members and other members who desire to go to Washington to consult libraries and museums, a better opportunity to visit that city.

On motion the Chair was authorized to appoint a committee to consider this matter and report at the last session.

The following committee was appointed: Mr. H. T. Fernald, Mr. T. J. Headlee, Mr. Glenn W. Herrick.

At the session on Friday morning, January 2d, the closing business of the meeting was transacted.

PRESIDENT P. J. PARROTT: I will now call for the report of the Committee on Amendment to the Constitution.

REPORT OF THE COMMITTEE ON THE CONSTITUTION

Considering that the Association now has two vice-presidents, one of which presides over the section of Horticultural Inspection and the other over the section of Apiary Inspection; that in the absence of the President there is no regular officer to preside over the general meeting if held at the same time as the section meetings; and that it is often impossible for all of the officers to be present,

Therefore, the committee recommends the adoption of the proposed amendment to the Constitution as published in the program providing for "one vice-president and an additional vice-president for each section."

While the committee was considering the amendment to the Constitution, it also took up the question of the by-laws, especially regarding the dues, and begs leave to submit the following for future consideration:

The committee suggests that beginning with the year 1915, the annual dues be increased: that the dues of active members be raised to two dollars (\$2.00) and those of associate members to one dollar (\$1.00). This necessitates an amendment to the by-laws which cannot be acted upon at this meeting, but the committee recommends that the Secretary-Treasurer be instructed to publish a notice of this change in season for action at the next annual meeting.

W. E. BRITTON,
S. J. HUNTER,
FRANKLIN SHERMAN, JR.,
Committee.

MR. E. P. FELT: I move that the recommendations of the committee be adopted.

MR. C. GORDON HEWITT: I should like to second that motion but think it should be made clear that the vice-presidents who preside over the sections should be designated so that there will be no misunderstanding.

PRESIDENT P. J. PARROTT: I think that this is implied in the report and unless there is objection the vice-presidents will be designated so that there will be no misunderstanding as to the sections over which they will preside.

MR. H. T. FERNALD: I would like to ask whether one vice-president for the general Association is likely to be always sufficient. I recall at least one meeting at which at the last moment we found that one of the vice-presidents was unable to be present. If we had not known before that the president could not be there and if we had not a second vice-president we would have been without a president *pro tem*. It is merely a question of whether or not more than one vice-president for the general Association might be advisable.

SECRETARY A. F. BURGESS: It seems to me that the number provided for in this amendment will, except in extreme emergency, be sufficient. At the St. Louis meeting a number of years ago, only one officer of the Association was present. That happened to be myself, who was Secretary at that time. But the late Dr. James Fletcher was called to the chair to preside and we had a most enjoyable meeting, and I think if such emergency should arise again we would probably get along as nicely.

MR. E. P. FELT: It seems to me that if the president and vice-president-at-large were both absent, the first sectional vice-president could call the meeting to order and complete the organization.

On motion the report of the committee was accepted and its recommendations adopted.

PRESIDENT P. J. PARROTT: I will now call for the report of the committee on Publication of Economic Literature.

The report which was presented at the first session was read by Doctor Britton and at the suggestion of Doctor Felt the part of the report concerning the publication of the bibliography of economic entomology was considered first.

MR. W. M. WHEELER: I would like to inquire if it is to be the general policy of the Association to go into the publication of entomological literature.

PRESIDENT P. J. PARROTT: I do not think so. The question to be considered is in regard to the publication of the bibliography.

MR. W. M. WHEELER: As I understand it, the recommendations of the committee are made in case the government will not undertake the publication of the bibliography. It occurs to me that there are other alternatives. It is the function of many academies and scientific institutions to publish papers that cannot be handled by Journals, and it seems to me that it might be worth while to see whether this paper could not be published by some of these institutions. I am

personally very pessimistic about the publication of such papers in the hope of getting back the cost of the publication. Our smaller Journals find it difficult to escape a deficit at the end of the year. I think we ought to be very careful about attempting the publication of large works which might involve the finances of the Association.

MR. W. E. BRITTON: It seems very difficult to get any one to publish this bibliography. The Department of Agriculture at Washington takes the stand that the *Experiment Station Record* already covers the field and that it is not desirable to duplicate the work. I do not know that this is a part of the general policy for this Association to begin publications. It is believed that we could have the manuscript prepared and secure enough advance subscriptions to the publication so that we would be warranted in having it printed.

MR. C. GORDON HEWITT: Would it not be better for the Association to first undertake the preparation of the manuscript without making advance arrangements in regard to publication. It would then be possible to negotiate with some of the institutions as suggested by Doctor Wheeler, with a view to seeing whether they would be willing to publish it. In case they would not, we could take up the matter of publishing it, but before the Association commits itself to publication I think that we should be certain that we will not be in a position to lose, that is, we should be sure of having enough advance subscriptions to cover the cost of publishing. We have now become incorporated and the whole Association would be more or less responsible for the obligations incurred.

MR. W. E. BRITTON: I think the views of Doctor Hewitt are very similar to those entertained by the committee, except that we would not wish to prepare the manuscript unless there was a general sentiment in the Association favoring its ultimate publication. We would like to have the work all done by the Bureau of Entomology, if this is possible, but in case it cannot be done in that way it will be necessary to take it up by a number of men coöperatively, and this, of course, will involve a tremendous amount of work.

MR. C. GORDON HEWITT: Has the Department of Agriculture definitely refused to undertake this work?

MR. W. E. BRITTON: I do not know that they have definitely refused, but they do not talk very encouraging concerning it. We hope that the Department will act favorably.

MR. C. GORDON HEWITT: Would it not be best to definitely approach the Department first and find out whether it will or will not publish the bibliography? If a negative reply is given, then I think the Association could take up the question of its preparation. After it is prepared the matter of publication could be taken up with other

institutions. I think this would be the safest policy, and it seems to me the most desirable.

PRESIDENT P. J. PARROTT: Something has already been done with reference to approaching the authorities for the purpose of securing this publication. In case of complete failure this provides for the Association to do the publishing.

MR. E. P. FELT: From my viewpoint I regard the bibliography of economic entomology as exceedingly useful and as a business proposition I believe that practically every important entomological office in the country could afford to pay \$10 a year rather than to be subjected to the annoyance of getting along without it. As has already been stated, repeated efforts have been made to interest the federal authorities in its publication and if the matter goes over for another year on the present basis, it will mean that in January, 1915, we will be in about the same position as we are now, unless we can secure favorable action. On the other hand, if the matter is put into the hands of a committee which is given authority to first exhaust every available source of publication, and in the event of that failing to arrange to have the references assembled during the year, we would have the data in shape in 1915. Of course the expense is something, but I would rather lose \$5 on a venture of this kind and be moderately sure of having the bibliography for reference in 1915 or 1916, than to let the matter drift. This publication will be a help to every entomologist and if this Association is for the advancement of economic entomology, it seems to me that in this form of activity we have something which ought to be exceedingly useful.

MR. W. C. O'KANE: I would suggest that before the bibliography can possibly be published, this Association will meet again. The work of preparing the references should begin soon, but I do not believe that the committee should attempt this work unless there is some assurance that the manuscript will be published. It seems to me that the maximum price mentioned in the report may be too low and I think the price should not be decided on until further information is secured as to the size of the publication.

MR. C. GORDON HEWITT: I do not wish to be misunderstood in regard to the suggestions I have made, for I agree with the previous speakers that it would be unfair to the committee for them to prepare the data unless there was certainty that it would be published. Everyone agrees as to the enormous value of the work, but I think the question of publication could be decided at the next meeting after the manuscript was more or less prepared. I am perfectly willing to stand my share of any losses and to subscribe for a number of copies.

MR. W. M. WHEELER: In the publication of such works which are

very necessary to entomologists I find that institutions will take a single copy and that in many cases none of the people connected with the institution will subscribe. The number of publications has increased enormously within recent years and there is much free literature and many reprints of articles distributed so there is less sale for complete publications to individuals. Some of the men who feel that they would like to have a copy may not be able to subscribe, although we all agree that this is of utmost value and should be published.

MR. W. E. BRITTON: Many of the members of this Association already own the earlier numbers of this bibliography. These were printed by the Department of Agriculture and distributed free. They are catalogued by second-hand book dealers and have a definite value. Those of us who have the earlier numbers would undoubtedly buy the one which it is proposed to publish, so as to have a complete set. For this reason there would probably be a larger sale than otherwise.

MR. E. P. FELT: The committee in preparing this report made a canvass of the probable sale of this publication basing it somewhat on the subscription list to the JOURNAL and assuming as a basis that only one quarter of the JOURNAL subscribers would purchase the bibliography, we would have sale for about 175 copies. Taking another basis for estimate, there are 50 states which have one or more entomological institutions and in each one of these states, it is fair to assume, one entomological office and one entomologist (or two entomological offices and no entomologist), would each subscribe, this would give a sale for approximately 100 copies. It is probable that subscriptions could be obtained from approximately 100 libraries, so that the probability of securing orders for 200 copies is very good and this could be made to cover most of the expense involved.

MR. T. J. HEADLEE: I move the adoption of the first part of the report. (Seconded.)

MR. W. C. O'KANE: I would like to offer an amendment, so that the maximum price of the publication may be determined by the Association at a later date.

It was voted that the motion as amended be adopted.

PRESIDENT P. J. PARROTT: We will now consider the second section of the report which relates to the publication of the manuscript prepared by Mr. Caudell.

MR. HERBERT OSBORN: I move that the consideration of this part of the report be postponed until next year. (Seconded.)

MR. W. E. BRITTON: I would like to say that the manuscript already for the printer. It has been submitted to the Department of Agriculture, the Carnegie Institution, and many other organizations but they are all unable to publish it. The matter contained in it

Edwards' Catalogue of Lepidoptera brought down to date. Doctor Howard states that the Bureau of Entomology would furnish the manuscript in perfect condition for printing and Mr. Candell would be willing to read the proofs.

MR. HERBERT OSBORN: I would like to say that while I appreciate the importance of this publication, that we are now committed to the other project and have undertaken a rather large financial obligation. The bibliography, I think, is essential to every entomologist. This publication would have a more restricted use than the bibliography. It would, of course, be of great value, but it seems to me we ought to go rather slowly. I do not want to throw cold water on the project but simply feel that we should be a little cautious.

MR. E. P. FELT: I hardly agree with the previous speaker that this publication is likely to have a small circulation. I think it would appeal very strongly to all economic entomologists, and it would be valuable to a great number of systematists, collectors and a large number of people who would hardly be classed as entomologists.

By vote of the Association further consideration of this matter was postponed until the next annual meeting.

PRESIDENT P. J. PARROTT: I will now appoint the following committee to take charge of the publication of the bibliography of economic entomology: Mr. E. P. Felt, Chairman, Mr. W. E. Britton, Mr. W. E. Hinds, Mr. W. C. O'Kane, Mr. A. F. Burgess.

PRESIDENT P. J. PARROTT: I will now call for the report of the Committee on Auditing.

REPORT OF THE AUDITING COMMITTEE

Your committee has audited the books and accounts of the Secretary of the Association of Economic Entomologists and the Business Manager of the JOURNAL OF ECONOMIC ENTOMOLOGY and finds them correct.

J. G. SANDERS,
E. C. COTTON,
Committee.

Voted that the report of the committee be accepted.

PRESIDENT P. J. PARROTT: The next business will be the report of the Committee on Resolutions.

REPORT OF THE COMMITTEE ON RESOLUTIONS

Your committee on resolutions begs leave to report as follows:

Resolved, That we express our appreciation of the courtesies of the people of Atlanta, Governor Slaten and wife, the State Entomologist and staff, Atlanta Convention Bureau, Capital City Club, University Club, Local Press and the Atlanta Medical College; of the officers of the Association for their effective work and especially the President for his admirable address, the Secretary for his earnest and efficient work in behalf of the Association, and the Editor of the JOURNAL for the successful continuation of this enterprise;

That we heartily commend the efforts being made by the New England States and Canada toward the control of the gipsy and brown-tail moths, which stand as such a serious menace to the whole country, and express the hope that this vigilance be in no degree relaxed, that coöperation with Federal control be maintained and that the officers charged with the enforcement of the Quarantine Regulations against these pests be supported in every possible manner to the end that the spread of these pests throughout the country be retarded to the greatest possible extent.

That the individual members of this Association, wherever located, be urged to use every opportunity to further general support of the Quarantine and Inspection Regulations in order that the greatest measure of success may follow their enforcement.

Respectfully submitted,

HERBERT OSBORN,
GEO. A. DEAN,
WILMON NEWELL,
Committee.

Voted that the report be adopted.

PRESIDENT P. J. PARROTT: We will now listen to the report of the Committee on Membership.

REPORT OF THE COMMITTEE ON MEMBERSHIP

The Committee on Membership recommends:

(1) That in case active members desire to nominate associate members for active membership they shall file such nominations with the chairman of the membership committee at least three months prior to the annual meeting; such nominations shall be accompanied by full information concerning the nominee's publications and other qualifications.

(2) That nominations for foreign membership together with full information concerning the publications and other qualifications of the nominee shall be filed with the chairman of the Committee on Membership at least three months before the annual meeting.

The committee recommends:

For transfer from associate to active membership:

Hyslop, J. A., Hagerstown, Md.	Schoene, W. J., Blacksburg, Va.
Peairs, L. M., Morganstown, W. Va.	Shafer, G. D., East Lansing, Mich.

For associate membership:

Aldrich, J. M., Lafayette, Ind.	Hood, Clifford E., Melrose Hills, Mass.
Anderson, G. M., Clemson College, S. C.	Kewley, Robert J., Lafayette, Ind.
Burgett, E. L., Grantsville, Utah.	Laake, Ernest W., Dallas, Texas.
Bilting, Sherman W., College Station, Texas.	Leiby, Rowland W., Ithaca, N. Y.
Classon, P. W., Lawrence, Kansas.	Loftin, U. C., New Orleans, La.
Crawford, D. L., Tampico, Mexico.	Lowry, Quincy S., New Haven, Ct.
Davis, Irving W., New Haven, Ct.	Marshall, W. W., College Station, Texas.
Dove, W. E., Dallas, Texas.	Matheson, Robert, Ithaca, N. Y.
Eagerton, H. C., Marion, S. C.	McDaniel, Miss Eugenia, E. Lansing, Mich.
Gibson, E. H., Greenwood, Miss.	Millen, F. Eric, E. Lansing, Mich.
Hawley, Ira M., Ithaca, N. Y.	Nougaret, R. L., Walnut Creek, Cal.
Hayes, William P., Manhattan, Kansas.	Parker, Ralph R., Amherst, Mass.

Preston, Harold A., Melrose Hlds.,
Mass.
Stafford, E. W., Agricultural College,
Miss.
Swaine, James M., Ottawa, Canada.
Talbert, Thomas J., Columbia, Mo.
Thomas, W. A., Clemson College, S. C.

Tower, Daniel G., Amherst, Mass.
VanZwaluwenberg, Reyer H., Maya-
guez, Porto Rico.
Welch, Paul S., Manhattan, Kansas.
Woodin, G. C., E. Lansing, Mich.
Wooldridge, Reginald, Melrose Hlds.,
Mass.

The committee recommends the resignations of C. H. Fernald, J. G. O. Tepper, A. U. Pike, and J. F. Zimmer be accepted, and that the Secretary be requested to express to C. H. Fernald and J. G. O. Tepper, the regrets of the Association of Economic Entomologists, that they feel obliged to discontinue their formal connection with the Association.

The committee recommends:

That the Secretary be instructed to notify the three active members and the eight associate members who are in arrears for dues for two years, and the three associate members who were elected last year who have not paid their first year's dues, and if such dues are not paid before the next printed list of members goes to press, to drop their names from the roll.

H. E. SUMMERS,
R. A. COOLEY,
WILMON NEWELL,
Committee.

MR. T. J. HEADLEE: I move that the report be adopted. (Seconded.)

MR. HERBERT OSBORN: I would like to offer an amendment that in the case of Prof. C. H. Fernald, whose name was mentioned in the report, that the Secretary be instructed to remit dues and that Professor Fernald be retained on the roll.

The amendment was seconded and the original motion as amended was adopted by unanimous vote.

PRESIDENT P. J. PARROTT: I will now call for the report of the Committee on Future Meetings.

REPORT OF THE COMMITTEE ON FUTURE MEETINGS

The Committee on Future Meetings presents herewith the following report:

The committee is of the opinion that the interests of the members of this Association are not only closely related to the American Association for the Advancement of Science, but also to the Association of Agricultural Colleges and Experiment Stations.

The recommendation is therefore made, that this Association continue to meet with the American Association except perhaps once in three or four years, but at such times it meet with the Association of Agricultural Colleges and Experiment Stations at some time when that Association shall meet in Washington, D. C.

The explicit recommendation is offered, based on the last statement, that this Association meet with the American Association one year from this time, and with the Association of Agricultural Colleges and Experiment Stations at Washington 1915.

Respectfully submitted,

H. T. FERNALD,
THOMAS J. HEADLEE,
GLENN W. HERBICK,
Committee.

MR. H. E. SUMMERS: It seems to me that there is one portion that is to be somewhat regretted. The American Association for the Advancement of Science will undoubtedly meet in Toronto in 1915-1916, and I do not think we should lose the opportunity of meeting with that Association in Toronto at that time.

MR. E. P. FELT: I think it would be desirable to hold our meeting at Toronto in 1915. There are many important entomological problems on the other side of the border.

MR. WILMON NEWELL: I move the adoption of the report. (Seconded.)

MR. H. E. SUMMERS: I would move that the report be amended so that the question of the place of holding the annual meeting in 1915 be decided at our next annual meeting.

By vote of the Association the report as amended was adopted.

PRESIDENT P. J. PARROTT: I will now call for the nomination of the JOURNAL officers by the Advisory Board.

MR. HERBERT OSBORN: We nominate the present staff of the JOURNAL, as follows: For editor, Dr. E. P. Felt; associate editor, Dr. W. E. Britton; business manager, Mr. A. F. Burgess. We also recommend that the price of the JOURNAL to non-members, beginning January 1, 1915, be raised to \$2.50 per year, provided the dues to members of the Association are increased at the next meeting as is contemplated in an amendment to the by-laws of the Association.

The recommendations of the Board were adopted.

PRESIDENT P. J. PARROTT: I will now call for the report of the Committee on Nominations, by Mr. W. D. Hunter.

REPORT OF THE COMMITTEE ON NOMINATIONS

The committee nominates the following:

For president, Dr. H. T. Fernald.

For vice-president, Prof. G. W. Herrick.

For vice-president for Horticultural Inspection, Dr. W. E. Britton.

For vice-president for Apiary Inspection, Prof. Wilmon Newell.

For Committee on Nomenclature, Dr. E. P. Felt.

For Committee on Entomological Investigations, Dr. W. E. Hinds.

For Councillors of A. A. A. S. Prof. H. E. Summers, Prof. Herbert Osborn.

For Committee on Membership, Prof. W. C. O'Kane.

For Entomological Employment Bureau, Dr. W. E. Hinds.

For Advisory Board of JOURNAL, Dr. L. O. Howard, Prof. Wilmon Newell.

Respectfully submitted,

W. D. HUNTER,
F. L. WASHBURN,
R. A. COOLEY,
Committee.

MR. S. J. HUNTER: I move that the report be adopted and that

The Secretary be instructed to cast the ballot of the Association for these nominations.

This motion was seconded and carried.

The ballot was cast by the Secretary and the President declared those members named by the committee to be the officers of the Association for the ensuing year.

PRESIDENT P. J. PARROTT: Is there any miscellaneous business to be transacted?

MR. T. J. HEADLEE: I would like to inquire if some method cannot be devised so that the meeting of the sections on apian inspection and horticultural inspection will not be held co-incidentally with the meetings of the general Association. Yesterday, with the exception of the first meeting in the morning, I was unable to hear the program presented before the general meeting of this Association. I would like to attend all of the sessions and there are other members who have had the same experience. In talking with the Secretary of the Entomological Society of America and with the Secretary of this Association, it appears that if the titles of papers were received promptly, it would be possible to arrange the program more satisfactorily. If it is only a matter of securing the titles before a certain date it would be a very simple matter to solve this problem. I therefore move that it is the sense of this meeting that the Secretary be instructed to fix a definite date before which the titles of all papers to be presented at the next meeting should be in his hands, and that titles received after that date shall not be admitted to the program. (Seconded.)

MR. E. P. FELT: I sympathize with Doctor Headlee's motion and its intention. The only difficulty is that this rule might prevent us from hearing some extremely important papers. Would not an appeal to the common-sense of the members be sufficient to accomplish the desired results.

MR. T. J. HEADLEE: It did not do so this year.

SECRETARY A. F. BURGESS: Perhaps I can clear up matters a little by explaining the situation. In order to have the JOURNAL printed on time and to include the program so that it can be in the hands of members and not become lost in the rush of mail at Christmas time, it is necessary to receive the titles of papers about the middle of November. Our contract with the printers provides that they can require 30 days to get out the copy after it reaches their hands. In the last issue of the JOURNAL an index is prepared which is of advantage to everyone, but this index cannot be made up until the last issue is a page proof. This makes a delay in printing and mailing. This year the preliminary notices of the meeting were sent out and the

date of expiration before which titles should be received was fixed : - November 12. At that date it was apparent that the number of papers that would be on the program at this meeting would not be very large. The number of titles received for the meetings of the section on horticultural inspection was very small indeed and only one paper was received for the section on apiary inspection. That was the condition when the program was made up and the time was allotted, believing that the sectional meetings would be very light and that there would not be serious interference with the general meeting of the Association. On the general program of the Association the papers were classified so as to interfere as little as possible with the sectional programs. Between the time that the program went to press and the galley proof was returned, a considerable number of titles were received and these were inserted in the proof. After the program had been printed and distributed more titles were received, so that this explains the practical difficulty with which the Secretary is confronted if he tries to accommodate all the members who wish to send in titles. Last night on talking with Doctor MacGillivray, secretary of the Entomological Society of America, it was suggested that the meetings of this Association be held during the first part of the week, and that those of the Entomological Society of America take place later in the week. This arrangement will undoubtedly give us an opportunity to hold the sectional meetings with less interference than we have had at this meeting. If we meet at Philadelphia next year there will be a heavy program and it will take considerable planning to arrange it satisfactorily. I can assure you that the Secretary will be glad of any suggestions which will aid in making the program more satisfactory.

MR. HERBERT OSBORN: I would like to ask the Secretary if it would not be possible to print the program separately from the JOURNAL. This might avoid the difficulty of reading the proof of the JOURNAL and the expense of sending out separate programs would be a minor consideration.

SECRETARY A. F. BURGESS: This would probably result in allowing the titles to be sent in several days later than in previous years, but still it would be necessary to forward the programs in good season owing to the large amount of mail which is handled at Christmas time. I do not think there is serious difficulty in getting out the JOURNAL if the titles come in promptly so that we have the business to handle. We don't get the titles promptly and this makes difficult in handling them.

MR. E. P. FELT: It would not save materially in making up the JOURNAL whether we had the program in it or not. Sometimes we are delayed a little on account of the program.

By vote of the Association the motion was carried.

MR. E. P. FELT: Inasmuch as we are now a corporation, I move that the Executive Committee be authorized to have an official seal prepared.

It was voted that the Executive Committee be so authorized.

MR. A. W. MORRILL: I would like to call the attention of the Association to the plan which is being used by the botanical section, of presenting abstracts instead of complete papers. This plan has been found to work very satisfactorily and if we adopted it and limited abstracts of papers to five minutes we would save considerable time. I would move that at the next meeting this plan be adopted and that abstracts not to exceed five minutes be presented instead of papers. (Seconded.)

MR. E. P. FELT: There is one question that comes up in this connection and that is the practical question of publication. If the Association is to attempt to publish papers presented before it by abstract we may be undertaking a rather large contract. It is my opinion that some papers, at least, which have been prepared in the past, were practically abstracts and published as papers. If we had some very extended papers we would get into difficulty if we undertook to publish them in full on account of our limited means.

MR. FRANKLIN SHERMAN, JR.: Do we not have a rule that limits papers to 15 minutes? It seems to me that that length of time is short enough.

MR. WILMON NEWELL: I would like to offer an amendment to the motion, that it is the sense of this Association that a party presenting a paper should give an abstract rather than read the paper in full.

The motion, as amended, was adopted by the Association.

MR. W. E. BRITTON: Before we adjourn I would like to request the members to forward to me as many current notes as possible for publication in the JOURNAL.

A question: Is a man supposed to apply for transfer from associate membership to active membership?

MR. H. E. SUMMERS: I think the custom has been that it is not good form for an associate member to apply direct. It is rather a matter of individual taste. In many cases associate members who are worthy of active membership have not been selected for years, because the committee has not had their names under consideration. Under the new plan, which will be carried out by the membership committee, of which Prof. R. A. Cooley is chairman, for the next year, the committee will go over the list of associate members and it is always good form to ask the committee in going over the list to consider the name of any one who should be promoted.

SECRETARY A. F. BURGESS: I find that most papers delivered at the meeting have been handed in. I would like to state, however, that unless there is decided objection I shall depend on the members, who have presented papers, to forward them promptly so that they can be published.

MR. W. C. O'KANE: In connection with the program, would the Association think it worth while next year to have a few minutes reserved on the program for a question box, so that such matters as apparatus and equipment can be considered and discussed.

PRESIDENT P. J. PARROTT: What shall we do with this suggestion?

MR. E. P. FELT: Receive it gratefully without formal action. Thereupon the Association adjourned.

PART II, PAPERS AND DISCUSSIONS

PRESIDENT P. J. PARROTT: I will ask First Vice-President Worsham to take the Chair.

VICE-PRESIDENT WORSHAM: We will now listen to the annual address of our President.

THE GROWTH AND ORGANIZATION OF APPLIED ENTOMOLOGY IN THE UNITED STATES

By P. J. PARROTT

I am deeply conscious of the honor which I enjoy, and the responsibility that now rests upon me in presenting the annual address to this Association. With this brief acknowledgment it should also be stated that I have shared the perplexity of my predecessors in this chair as to choice of subject; but as this is the twenty-sixth annual meeting of this organization, which therefore constitutes the first gathering of this society for the new quarter-century—an appropriate time for a review of past activities—I have chosen for my theme, "The Growth and Organization of Applied Entomology in the United States."

The selection of this topic was prompted by the consideration that a conspicuous feature of entomology, especially during the past twenty-five years, which covers the life of this society, was the rise of the entomological expert with his official connections and of organizations of workers engaged in the promotion of agriculture—a movement which has exerted a profound influence on the aims and success of this branch of science in this country. A discussion of this subject must necessarily be of a somewhat cursory nature, and general rather than specific

as there are several subdivisions under this head that might be individually treated at length and deserve detailed consideration.

UTILITARIAN DEVELOPMENT OF ENTOMOLOGY

Subjects, it is said, arise according to the atmosphere of civilization, and take color, value and strength in proportion to their connections with the real life of the people. This is, in brief, the history of all departments of science, and such has been the experience of economic entomology. Once the study of the lover of the open fields—the student of nature—this branch of science has taken on larger value and importance, and has now become a profession, which is calling to its service men of serious intellectual power who are engaged in real constructive work for the welfare and prosperity of mankind. In the acquirement of knowledge in the domain of injurious insects and in the quest for large economic results, entomology in the United States has made rapid and substantial progress. The opportunity here for economic studies has been great, for agriculture has always been the leading occupation of our people and a great source of national wealth; while insects, on the other hand, have constituted one of the chief handicaps to agricultural prosperity, and are of increasing significance.

A study of agricultural literature, even in the days when science did little directly for agriculture, shows that there were few subjects which more widely received attention from our farmers than that dealing with insects. Historically, there has been a direct and important connection between the appreciation of the practical value and the necessity of entomological knowledge on the part of the American farmer and the progress of entomology in this country. Inability of individuals to cope successfully with destructive species led to applications to legislatures for assistance. Under state aid a new form of public activity was brought to the service of agriculture, while under the stimulus of liberal financial assistance from both the federal and state governments there has been a remarkable elaboration of new thoughts, lines of effort, and organizations of workers that have counted constructively for the demonstration of the practical value and importance of entomology. It is pertinent to my subject to note at this time some aspects of the rise and growth of entomology under public support and some developments that have taken place in the organization of efforts in the behalf of agriculture.

HISTORY OF STATE AID IN APPLIED ENTOMOLOGY

Legislative aid to entomology was the inspiration of Massachusetts, which was the first state¹ to extend financial assistance for an entomo-

¹L. O. Howard, U. S. Dept. of Agr. Yearbook, 1899, p. 136.

logical survey, with the special object in view of giving a careful and intelligent consideration of the injurious insects within its confines. This was one of several lines of efforts undertaken by the commissioners of the Zoological and Botanical Survey of this state, which received its official instructions in 1837. The purpose of this movement was to "collect accurate information of the state and condition of its agriculture and every subject connected with it, point out the means of improvement, and make a detailed report thereof, with as much exactness as circumstance will admit." In the division of duties Dr. Thaddeus Harris, as one of the commissioners of the survey, assumed responsibility for the entomological project. Differing from the usual conceptions of the work of a natural history survey, his aim in this effort as expressed by himself was to fill the want of a work, combining "scientific and practical details on the natural history of our noxious insects," which would be at least interesting and useful to the great body of the people. His contribution to the work of the survey was his remarkable treatise on "Insects Injurious to Vegetation." Because of his service in this undertaking, Harris has been referred to as the first official economic entomologist in this country. However, aside from the above achievement, he carried on his entomological activities independent of official connections. A naturalist at heart, he pursued his studies, for which he was remarkably gifted by nature and intellectual training, from a sense of love of the work itself.

As in Massachusetts, legislative support for entomology in New York has its inception in the Natural History Survey, which under the influence of public interest was begun in 1837, and has practically continued to the present time. One of the motives back of this effort was the advancement of agriculture, as this industry and mining were considered the two subjects to be most benefited by the proposed project. For the work to be undertaken in behalf of agriculture Dr. Ebenezer Emmons¹ was recommended by the State Agricultural Society, and he was thereupon appointed by Governor Seward, at the same time retaining his title as State Geologist. It was understood at the outset that his reports should be completed in one year. However, Emmons was not prepared to publish his contributions for several years after the undertaking was begun, and the first of his reports did not appear until 1846. Five volumes were eventually compiled by him under the title "Agriculture" in the "Natural History of New York," and of these, one volume dated July 25, 1854, is devoted to insects injurious to agriculture. The author, a geologist by profession, states that a part of his labor was to collect materials in the field, and

¹ A. C. True, U. S. Dept. of Agr. Yearbook, 1899, p. 162.

² Letter from Dr. John M. Clarke, N. Y. State Museum, Aug. 19, 1913.

another to "collect them from the researches of others," among whom Dr. Asa Fitch is mentioned. Emmons' contribution to entomology is of much the same nature as other reports of the Natural History Survey dealing with zoölogy, etc., in that it is largely devoted to the enumeration of species, with more or less detailed descriptions, while the economic contributions are small. This may be explained by the fact that the author was working in a field outside of his own speciality.

Following on the heels of the foregoing surveys, there arose a distinct type of entomological service, maintained by a public fund provided by taxation, which in scope and influence marks an advanced step in applied entomology in America. This new movement dates back to the fifties and sixties of the last century and had its origin in agricultural societies in different states, which at this time were the most prominent and influential organizations in encouraging and directing those things which would improve and develop the agricultural interests of the different states. Credit for a new departure with respect to entomology belongs to the New York Agricultural Society, which, it appears, was dissatisfied with the progress, if not with the value of the work of the Natural History Survey in the furtherance of agriculture. A specific complaint was made by this Society that the state had made a thorough examination of all departments of its natural history except its insects, and that the publications as a whole were too purely scientific in their character to be of special value to the great mass of citizens. For the distinct purpose of completing the work of the survey in this particular, the legislature appropriated one thousand dollars with which to commence this undertaking. It is, moreover, of interest to note that this project was placed in charge of the State Agricultural Society that the "investigations might be conducted with a direct reference to economy, as well as scientific accuracy." Dr. Asa Fitch, a physician by training and an enthusiastic student of insect life, was selected for the task and with the appointment his name appears under the title of Entomologist in the list of the officers of the Society for 1855, continuing until 1871. The only other department of science similarly officially recognized at the initiation of his work was that of chemistry, indicating not only the comparative importance then attached to entomology, but showing how few of the different branches of science were being called upon at even this late date to give aid to agriculture.

Ostensibly the purpose of the New York Agricultural Society in employing Fitch was that he should direct an entomological survey. In view of the criticisms directed against the technical nature of some of the productions of the Natural History Survey, he was especially authorized, in this endeavor, to give equal prominence to the economic

aspects of insects and to those of more technical interest. This he attempted to carry out, and, using his own words, his effort was really a survey of the economic entomology of New York, covering the whole range of injurious insects, as recognized by him, attacking the different agricultural crops. The merit of Fitch's writings is that they bring together existing knowledge dealing with the economy of insects, which is supplemented by his own observations. The correct identifications and descriptions of insects and his orderly arrangements of facts contrast strongly with much of the information given by practical agriculturists of his day, which was often inaccurate and therefore misleading, if not worthless.

As in New York, the beginnings of entomological work by state aid in Illinois and Missouri can be traced to the agricultural societies of these states. Early in the history of its organization the Illinois State Agricultural Society,¹ through its executive committee, declared that a considerable part of the losses by insects in this commonwealth could be saved through the labors and investigations of a competent entomologist, and that it was the duty of the legislature to provide at an early date for a thorough investigation for destructive insects for which not more than \$2,000.00 per annum should be appropriated. Resolutions embodying these ideas were endorsed over a period of several years by the state agricultural and horticultural societies and the Society of Natural History, which led eventually to the appointment of a state entomologist—an office that has ever since been maintained and “which² stands second in point of origin and first in point of service on the list of the state agencies of scientific and economic research.”

In Missouri, legislative support to entomology was brought about by the activities of the State Board of Agriculture. In outlining the needs of this organization in order to increase its efficiency and usefulness for the farming interests, its Secretary in 1866 called attention to the desirability of having at command of the Board the services of an entomologist. In the proceedings of this body in 1867 a resolution was adopted calling for the appointment of a state entomologist as well as a state geologist, and for an appropriation by the legislature of \$5,000.00 per annum in order to carry out the proposed projects. Successful in its plans respecting entomology, the Board of Agriculture appointed Riley in 1868, from which year there began his masterly reports on the “Noxious, Beneficial and Other Insects of the State of Missouri.”

The period commencing with Fitch's appointment in New York and the conclusion of Riley's service in Missouri is in several respects a noteworthy one in the history of entomology in the United States. Each of the workers during this period achieved great success in his

¹ Transactions of Illinois State Agricultural Society, Vol. 5, p. 34, 1861-64.

² Dr. S. A. Forbes, Extract from Trans. Ill. State Acad. Sci. Vol. 2, 1909.

own field, and each made notable contributions to the literature of entomology, with which their names are firmly associated. Aside from their individual efforts in their respective fields, their work considered collectively takes on impressive proportions from the magnitude and the importance of the consequences of their endeavors in behalf of agriculture. That organizations of influential farmers and of men of prominence in agriculture and public affairs made the effort to open a new era by creating sentiment to encourage and support entomology by legislative enactment possesses of itself great significance. Then, also, the appointment of these men to official positions marks the definite turning of entomology for the benefit of agriculture—the passing out of the stage of mere amateurism into a serious and widespread endeavor to make entomology really serviceable to the people. Without eulogizing the achievements of these pioneer workers at the expense of critical justice, it must be admitted that their efforts constitute a remarkable period in applied entomology, which did much to impress the public with the value of this study and give it a degree of importance and stability, which it has retained. In the development of new agencies adapted to the needs of country life, which was foreshadowed at this time by the general agitation by various state agricultural societies and other organizations of farmers for institutions for teaching and experimenting in agriculture, entomology was given recognition with other agricultural subjects.

ENTOMOLOGY PROMINENT IN FEDERAL AID TO AGRICULTURE

In that which has preceded attention has been directed to some of the steps by which entomology was brought to the aid of agriculture and came to have rank with other departments of science in the agricultural field. In such a small compass, it has obviously been impossible to bring out many facts of interest or discuss in detail the achievements of individual workers, all of which have been sacrificed to the desire of exhibiting the major events in bold relief,—to show more clearly the great changes which have since taken place in entomology, to which my discussion now narrows. Since the days of Harris, Fitch, and Riley in Missouri, entomology has developed along distinct and in some respects, quite unique lines. This has been largely due to the far-reaching modern movements of agricultural education and investigation which has taken place with the rise and growth of the national Department of Agriculture and the land-grant colleges and associated experiment stations. By virtue of the achievements of its early workers in scientific and economic research, entomology became a constituent part of the work of these new agencies in behalf of agriculture by the establishment in the national Department of Agriculture of a Division, now Bureau, of Entomology, while in

nearly all of the agricultural colleges and experiment stations there have developed departments of entomology, which are active and influential centers in the different commonwealths for instruction and diffusion of entomological knowledge. During this period of the establishment and organization of government-aided institutions for agriculture, education and research, applied entomology has made extraordinary and rapid development, which is reflected in the large accessions to the ranks of entomologists and the extent of federal and state appropriations in support of this branch of science. The result of this great increase in facilities has been organized instruction, experimentation and research in entomology, and the rise of organizations of professional entomologists, which constitute the great contributions of the present era and are the outstanding features that mark a breach with entomological work of any preceding period.

For the sake of the interest which the comparison of such statistics may afford, as well as to show the scope and differentiation in entomological activities at the present time by the aid of public funds, the following table has been prepared. The statistical statements deal with the Bureau of Entomology in the U. S. Department of Agriculture and the departments of entomology in the institutions established under the Acts of Congress of July 2, 1862, and August 30, 1890, most of which maintain courses in agriculture; and with the agricultural experiment stations which, with few exceptions, are organized under the Act of Congress of March 2, 1887. The figures also include appropriations to various state institutions besides the foregoing, which employ entomologists for instruction or research in entomology or for the enforcement of agricultural laws designed to prevent the introduction of, and destruction of, injurious insects within the confines of the different commonwealths. Owing to the complex organizations of a number of institutions it has not been possible to give exact data in all cases, but generally the amounts¹ represent conservative estimates although in many instances they are quite accurate.

¹ These figures were obtained by means of a questionnaire. In compiling the data the estimates have been stated precisely as they were given. For purposes of accuracy the statistical accounts dealing with the work of a single state were in most instances submitted to the proper authorities for correction and approval. It was not possible to separate the amounts expended respectively for instruction, experimentation and investigation. It is believed that not all expenditures for 1912 are accounted for, as in some estimates no allowances were made for publication expenses, office help, etc. Moreover, in certain counties of a number of states large sums are raised by taxation for support of orchard and nursery inspection in addition to state appropriations, which were not taken into calculation, as are indicated in the accompanying table. The reports from several states dealing with the financial support for 1913 show great gains. The state of Pennsylvania has more than doubled its appropriations.

TABLE 1.—SHOWING EXPENDITURES UNDER STATE AND FEDERAL APPROPRIATIONS FOR THE SUPPORT OF VARIOUS ENTOMOLOGICAL ACTIVITIES DURING 1912

	For instruction, investigation and experimentation	For control of bee diseases	For control of insecticides	For control of special insects	For orchard and nursery insecticide and quarantine		Estimated total for insects
					Total funds	Approximate expenditures for insects	
Alabama.....	\$3,350.00				\$1,700.00	\$750.00	\$4,300.00
Arizona.....	5,500.00				6,800.00	2,600.00	8,160.00
Arkansas.....	2,300.00				100.00	75.00	2,375.00
California.....	66,691.68		\$6,063.00	\$3,000.00	11,500.00	?	75,694.68
Colorado.....	3,400.00				12,100.00	8,107.00	11,507.00
Connecticut.....	3,010.09	\$900.00		2,668.97	3,778.92	3,778.92	6,757.98
Delaware.....					100.00	100.00	100.00
Florida.....	2,700.00				3,000.00	1,300.00	4,200.00
Georgia.....	26,500.00				3,000.00	2,550.00	29,050.00
Idaho.....					20,000.00	15,000.00	15,000.00
Illinois.....	26,060.00				5,000.00	4,500.00	30,560.00
Indiana.....	3,700.00	3,900.00			8,000.00	6,000.00	12,700.00
Iowa.....	9,920.00	1,600.00			3,200.00	3,200.00	14,720.00
Kansas.....	17,455.00	750.00			10,300.00	8,155.00	26,360.00
Kentucky.....	3,658.00				500.00	333.33	3,991.33
Louisiana.....	3,200.00				300.00	300.00	3,500.00
Maine.....	2,300.00				30,000.00	1,000.00	33,300.00
Maryland.....	4,750.00				6,300.00	3,500.00	8,250.00
Massachusetts.....	8,850.00	2,100.00			250,000.00	12,600.00	272,850.00
Michigan.....	6,896.81		500.00		2,500.00	2,000.00	9,396.81
Minnesota.....	14,850.00				300.00	200.00	15,050.00
Mississippi.....	3,500.00						3,500.00
Missouri.....	2,730.00	1,250.00			1,000.00	950.00	4,930.00
Montana.....	5,870.00				14,500.00	11,600.00	17,470.00
Nebraska.....	6,400.00				900.00	850.00	7,360.00
Nevada.....	2,880.00						2,880.00
New Hampshire.....	3,625.00				12,500.00		16,125.00
New Jersey.....	4,800.00	2,000.00			25,000.00	9,000.00	37,800.00
New Mexico.....	200.00						200.00
New York.....	49,210.69	4,700.00	1,020.00		28,000.00	23,800.00	78,730.69
North Carolina.....	6,200.00				5,200.00	3,900.00	10,100.00
North Dakota.....	750.00						750.00
Ohio.....	15,200.00	2,700.00			21,000.00	15,750.00	33,650.00
Oklahoma.....	4,960.00				2,000.00	2,000.00	6,960.00
Oregon.....	8,500.00				12,000.00	6,000.00	14,500.00
Pennsylvania.....	5,000.00	3,000.00	5,000.00		35,000.00	31,500.00	44,500.00
Rhode Island.....	635.00	75.00			15,000.00	200.00	15,910.00

TABLE I.—*Continued*

	For instruc- tion, inves- tigation and experimen- tation	For control of bee diseases	For control of insecti- cides	For control of special insects	For and orchard nursery inspection and quarantine	Estimate total for insects
					Total funds	Approx- imate expend- itures for insects
South Carolina . . .	\$7,485.00				\$2,325.00	\$1,260.00
South Dakota . . .	3,100.00				300.00	200.00
Tennessee	2,950.00	\$1,000.00			7,000.00	6,650.00
Texas	8,200.00	2,750.00			10,594.00	9,534.56
Utah	5,495.00				5,000.00	4,220.00
Vermont		500.00				500.00
Virginia	800.00				6,000.00	5,100.00
Washington	4,350.00				37,500.00	33,750.00
West Virginia . . .	2,600.00				4,600.00	2,600.00
Wisconsin	1,680.00				3,000.00	3,000.00
Wyoming					1,500.00	1,500.00
National Bureau of Entomology	317,050.00			\$284,840.00		601,890.00

¹ No official entomologist, and what entomological work is done is incidental to other lines of agricultural effort.

² In Arizona, bee inspection is supported by fees collected from bee keepers; in Colorado, is carried on without special funds.

³ In Alabama, some of the other listed funds are spent for special work against the boll weevil; amounts listed for California and New Jersey are for mosquito control; for Connecticut, Maine, Massachusetts, New Hampshire and Rhode Island and the National Bureau of Entomology for gypsy moth and brown-tail moth control, and in the latter state in part for San José scale and elm-bark beetle work. In Massachusetts various Park and Highway Commissions and Metropolitan Water and Sewerage Board also spent \$85,900.81.

⁴ In addition to amount listed large sums are appropriated by certain counties for orchard inspection; in California the amount is estimated at \$1,000,000, employing 400 men for more or less time; in Oregon, \$15,000 and in Utah, \$10,000.

⁵ In these states still larger funds are available: Minnesota, \$3,000; New York, \$60,000 in all; Pennsylvania, \$83,000 in 1913.

⁶ Supported in part or entirely by fees from nurserymen, which are not listed. In Virginia \$2,000 is obtained from this source.

⁷ Approximate figures even are difficult to obtain,—certainly not less than amount given.

⁸ Done without special funds or handled indirectly.

The extent to which the various states were engaged in these different activities during 1912 is briefly summarized as follows: Forty-one states provided for regular instruction in entomology in the agricultural colleges, and forty-three states appropriated funds for the maintenance of experimental and investigational work. Twenty-six states were engaged in research studies under the Adams Fund on about fifty-seven entomological projects, which were financed at an approximate expenditure of \$44,536. For the support of nursery and orchard inspection, quarantine service, the control of insecticides, bee diseases and insects of unusual importance, all states but two made provision for funds for orchard and nursery inspection; twenty states for bee inspection, fifteen states for control of insecticides, while eight

¹ Letter of June 25, 1913, from Office of Experiment Stations.

states appropriated special funds to combat certain species of insects. The estimated amounts of money expended by the various states for the different lines of effort are as follows:

For instruction, and experimental and investigational work.....	\$374,262.27 ¹
For control of bee diseases.....	25,625.00
For inspection of insecticides.....	12,523.00
For control of special insects.....	338,168.97
For orchard and nursery inspection and quarantine measures against insects.....	245,553.81
Total amount.....	\$996,133.05

Expenditures by the National Bureau of Entomology during 1912 are as follows:

For investigational work.....	\$317,080.00
For control of gipsy moth and brown-tail moth.....	284,840.00
Total amount.....	\$601,920.00

Estimated total expenditures by the different states and the National Bureau of Entomology for 1912..... \$1,598,053.05

The difficulty of obtaining accurate data regarding conditions during earlier years permits only a few comparisons, showing the increase which has occurred in the numbers of official entomologists and the gains in public funds for the support of entomology in the institutions mentioned. In 1899,² twenty-five men were listed as entomologists on the staffs of the experiment stations, while in 1912³ one hundred and one individuals were recorded as serving in this capacity, being exceeded in numbers only by the workers in the departments of chemistry, horticulture and animal husbandry in the order given. Statistics bearing on the progress that has taken place in instructional work were not available but not less than one hundred and twelve persons were reported as being engaged in more or less teaching in entomology during the year in the state agricultural colleges and state universities. Accurate figures⁴ exist showing the remarkable development of the National Bureau of Entomology but for the sake of brevity only a few of them have been selected. During the last year of Riley's service, which was concluded in 1894, eleven men served on the permanent staff, while five men were employed for part time. The funds for the support of the work amounted to \$29,800. The force in 1912 comprised two hundred fifteen technically trained entomologists besides many

¹ Of this amount \$95,260.68 is reported as having been derived from federal funds in agricultural colleges and experiment stations, while the remaining amount represents appropriations from the different states.

² Experiment Station Bul. No. 1, Office of Experiment Stations.

³ Ann. Rept. Office of Experiment Stations for 1912.

⁴ Letter from Dr. L. O. Howard, Dec. 8, 1913.

other individuals who served as helpers. The budget¹ for 1913-1914 provides for an expenditure of \$752,210.00.

EXTENSION OF SCOPE OF APPLIED ENTOMOLOGY

The foregoing statistical accounts suggest many interesting and significant points for further elaboration, but only a few of them can in the brief remaining time be noted. Two impressive facts that stand out clearly are (1) the growth of entomological functions, and (2) the organization of entomological activities to keep pace with modern requirements. The increasing appreciation of the services that the entomologist can render for the public benefit has called into existence new endeavors, and further extensions of his activities are constantly being demanded. On his shoulders there has been laid the stress of unusual tasks and duties which not many years ago were neither foreseen nor expected. Indeed, things are being attempted which were not even conceived by the earlier workers as part of their possible functions. Broadly speaking, the principal fields in which most entomologists are occupied are instruction and experimentation or investigation, the line of cleavage between the latter being all too frequently indistinctly marked. Not only is the work along these lines being directed with increasing vigor and efficiency in many institutions, but the public is clamoring with greater insistence for extension activities of various sorts on a larger scale; also, for the further expansion and stiffening of inspection and control work, which now includes the certification of nursery stock for insects and plant diseases, examination of insecticides, inspection of bee diseases and control of mosquitoes and other insects that threaten the health and comfort of the community. The call for inspection and control work is especially urgent, never so urgent as today, and its importance has been perhaps underestimated and underemphasized in the past by both the federal and state authorities. The inspection of orchards and nurseries, particularly, is becoming more extensive and more complex. Once largely concerned with the San José scale, it is now directed against such pests as the gipsy moth, the brown-tail moth, the chestnut blight, the blister rust, etc., in addition to the more common and familiar species of insects and plant diseases. Because of the different seasons in which these species are most active or are most liable to be distributed, the attention of the inspection corps in some states is pretty well occupied for the entire year in this endeavor, leaving little time to devote to other duties.

To no class of entomologists have these demands afforded more serious problems than to those who are connected with the agricultural

¹ Letter from Dr. L. O. Howard, Dec. 8, 1913.

colleges and experiment stations. For in addition to their instructional and investigational work, they have attempted to direct many, if not all, of the other activities. The conditions, however, vary greatly with different states, and even with institutions in the same state, according to local demands, circumstances and financial resources. While these duties are useful and essential, the attempt to cover such a large field, especially with inadequate assistance and support, has unquestionably led to great diffusion of effort. Where efforts are so diversified no phase of the work, perhaps, suffers more than that of investigation.

Some of these difficulties that entomologists now experience will doubtless disappear as their departments become stronger and receive greater financial backing. In states where funds are more ample, these conditions are being remedied by a closer differentiation of activities. The work of instruction is gradually being separated from that of experimentation or investigation. There is also a growing tendency among entomologists of the experiment stations to subdivide their activities, by creating sections of workers within their respective departments who devote their entire energies to insects of particular crops,—as truck-crop insects, fruit insects, etc. The policy with reference to nursery and orchard inspection still continues to vary with different states. This branch of endeavor is gradually being taken over by the State Administrative Service, engaged in the enforcement of agricultural laws, although in a number of states it still remains a part of the work of the station entomologist.

Two good omens for investigational work in the future are the development of the extension efforts by the agricultural colleges and the present shifting of accent to the importance of investigation as the primary function of the station entomologist. Both of these movements are destined to bridge important gaps in existing machinery. The outstanding feature of a large part of our entomological work in the past has of necessity been its serious and practical tone. Most of the institutions we represent were established for the express purpose of devoting themselves to the solution of the problems of agriculture and of serving the needs of farming people. But if you will look carefully through any agricultural section, even the most prosperous, you will find farmers who would gladly profit by the advice of entomologists but who, for various reasons, have been unable to do so. There has been and is a great need for a more convincing and effective demonstration of the value of certain entomological teachings. While there is a wealth of literature dealing with the economy of injurious insects, there has been more or less failure, especially marked in some cases of effort, to interpret this information and put it to practical

uses. The work now projected by the Extension Departments of the agricultural colleges, of which the County Expert project is a part, should, if conducted by men with adequate training and experience, yield results of great significance, especially along the lines of field demonstration experiments based on trustworthy and well-established facts; and in the compilation of bulletins giving useful information on the more destructive species of insects. It is obvious that if the farmers generally can be taught by this new movement to take better advantage of such assistance as well as of the information which is available, the efforts of the workers on the instructional and investigational corps would be more constantly directed to the proper duties, and to that extent their efforts should prove more productive.

LIMITATION OF FIELD OF INDIVIDUAL EFFORT NECESSARY

Speaking for the experimentalist and investigator generally, there is real need for some relief from certain of the present demands on his time and energy if he is to conduct his studies most efficiently and produce results that are comparable to the best work in similar institutions elsewhere. Experimental and investigational efforts are demanding much more concentration of effort, besides requiring a greater outlay for their maintenance. In these respects the work of today differs greatly from that of the pioneer entomologists who largely employed the methods of observation and description, and in their publications often resorted to considerable compilation. The reasons for these differences are plain. As the more simple problems are solved, new and larger ones loom in view, many of which alone afford opportunity for the full exercise and application of the worker's ingenuity and knowledge. With some problems which have been handed on unsolved from the past, experimental and observational verification is surrounded by immense practical difficulties which will not be overcome except by dogged and thoroughgoing investigation. Field experiments, formerly very limited in scope, are now being conducted on a more extensive scale. These often are not confined alone to small plats on individual farms, but they may extend over large areas, even whole counties and tiers of counties. Future efforts will place greater emphasis on the importance of coöperation. There are projects involving the control of certain injurious insects which will find their final solution when conducted as community enterprises, aimed to advance the well-being not of any particular individual or interest, but the community as a whole, which acts as a unit in carrying out an entomological measure. Such undertakings, which will more and more characterize the work of entomology in succeeding years, call for undivided attention on the part of those engaged in such projects.

A positive point of improvement, especially in those institutions where the duties of station workers have not heretofore been clearly defined, is the encouragement to research by the support of and under the regulations of the Adams Act. This is a notable step in advance towards a sharper differentiation of the station's activities, as the enactment provides for a body of workers who are to conduct researches of a fundamental nature along lines which have been carefully considered and approved by a competent authority. This should prove a great stimulus to the prosecution of scientific investigation of the highest type in the field of agriculture, besides having the effect of giving stability to the work of investigation generally and insuring the investigators liberty to work on their problems without interference. This undertaking needs to be emphasized in the scheme of department operations, and ought to be on such a basis that it will attract the best students in entomology. The selection of suitable problems and the conditions under which investigations receiving this support can be most efficiently conducted and successfully advanced are prominent matters for consideration by every station entomologist.

PROMISE IN NEW BROAD PROJECTS

In reviewing the progress of entomology in this country one cannot fail to be impressed with the enormous advantages that may be derived from a deep and systematic cultivation of new fields of knowledge. The achievements in a comparatively brief period of years demonstrate, in a most striking manner, not only what thoroughgoing study, experimentation and research may accomplish for a particular branch of science, but for the material welfare of a nation. At a time when so much thought is being directed to the conservation of our resources as a basis for individual and social efficiency, it is well to recall that the prosperity of a nation depends not alone on its natural wealth, but also on the intelligence and skill of its citizens and the capabilities and weapons they can utilize in solving the ever-increasing problems that lie in the path of civilization. The farming interests in the United States have always sustained great losses from the depredations of destructive insects. One can hardly recall any phase of agriculture of today which is not conditioned by considerations on the economy of certain species. Not only do these agents have to be reckoned with in the production of crops, but, in the light of present knowledge on the dissemination of diseases, we now know that they are important factors as regards human health and comfort, so that the farmer as well as his acres of land may fall far short of their potentialities. Some aspects of these considerations apply with equal force to our cities, especially in the more thickly-settled portions of our country,

which are confronted with some serious problems dealing with individual and social well-being because of the activities of noxious insects.

From time immemorial the inroads of injurious insects on agriculture have been regarded as inevitable handicaps for which there was little or no amelioration. But in the period in which we have lived and worked there has been marked reversal of ideas on the part of the public in their thinking about insects, which is no more strongly indicated than in the dependence upon official entomologists for advice and direction, and in the high standing of the entomological profession in the varied organizations engaged in the promotion of agriculture. The entomologists in the agricultural institutions have been foremost in calling public attention to the importance of injurious insects and in devising methods by which they may be repressed, or losses by them reduced. Besides, they are also to be credited with having forced these facts upon farmers and for inaugurating far-reaching and effective policies which have been recognized in legal enactments. The results in farm economy by the encouragement of foresight and confidence for indifference or apprehension with respect to certain destructive insects, and the elimination of a large element of chance in the production of various crops by the development of a scientific basis for remedial and repressive measures have been of inestimable value. The rapidity of development and the present financial support are convincing proofs of the vitality of entomological effort of today in this country and of its increasing economic importance in the eyes of the commercial and scientific public.

VICE-PRESIDENT WORSHAM: You have heard this splendid paper by our President. The discussion will take place at the session tomorrow morning. I wish to take this opportunity, however, to state that we are very greatly indebted to our President for this splendid paper which has been so well prepared and which contains so much thought and valuable information.

PRESIDENT P. J. PARROTT: We will now take up the regular program, and listen to a paper by Mr. F. L. Washburn on "Today's Work in Applied Entomology."

TODAY'S WORK IN APPLIED ENTOMOLOGY

By F. L. WASHBURN

(Withdrawn for publication elsewhere)

MR. F. L. WASHBURN: I wish to state that I sent copies of the statements given in this paper to different entomologists, so that they

could have an opportunity to make any corrections which they desired.

PRESIDENT P. J. PARROTT: The next paper will be presented by Mr. W. E. Hinds on "County Organization in the Boll Weevil Campaign."

COUNTY ORGANIZATION IN THE CAMPAIGN AGAINST THE BOLL WEEVIL

By W. E. HINDS, *Auburn, Alabama*

The problem of controlling, or successfully minimizing injury by the Mexican cotton boll weevil is no longer primarily either an entomological or an agricultural problem. For several years past we have looked upon the campaign against the boll weevil as being a campaign for good farming. In the minds of many, at least, the agricultural changes which are taking place at the present time in the South, constitute much more than an agricultural revolution. We are coming to look upon the boll weevil as having brought some of the greatest blessings that have come to the South in a generation. This is true because the fight against the boll weevil has awakened the South to some of her greatest needs and is making her break loose from some of her greatest handicaps. Among these handicaps has been a one-crop system, and that crop raised principally upon a system of advances by which the crop has been mortgaged even before it is planted. The great mass of ignorant, illiterate black farmers of the South, indeed, present a barrier to any propaganda for progressive agriculture. The boll weevil is helping the South to see the folly of an all-cotton system and to appreciate the absolute necessity of a more diversified agriculture. The need for an increase of live stock production has been recognized and we believe that within the next generation the South is destined to become one of the greatest meat-producing sections of the United States.

Wherever it has gone, the boll weevil has helped to reduce the acreage in cotton, to reduce also the advances made upon the prospective cotton crop and to increase the planting of corn and other food stuffs and the production of live stock by which the farmer may be assured of living in spite of the boll weevil. These are steps in the right direction; but only a beginning in their general adoption has as yet been made.

The boll weevil has given to the South, and probably to the entire United States, the Farm Demonstration Work, which has become of estimable value in its benefits to the most progressive and open-

mined farmers especially. As outgrowths of the Demonstration work, we have the Boys' Corn Clubs and Pig Clubs and the Girls' Tomato and Canning Clubs. All of these organizations have as yet, however, been unable to reach the average cotton farmer of the South. The work must be multiplied and greatly extended before we can consider the campaign successful. It must not only reach the question of increased yields and greater profits from the sum total of farming operations, which is indeed the cornerstone upon which other phases of farming improvement must be based, but there must be provided some means for securing to the rural population a leadership and an initiative that they are in most cases incapable of supplying for themselves. We also face the fact that more farmers have moved from their farms into town, in order to give their children the benefit of better school facilities, than have left the farms because of inability to make a satisfactory profit from them. Others have tired of the isolation of their country life through roads that may be impassable for several months of the year.

For these and many other reasons we believe today that the progressive agricultural movement in the South involves not only the production of crops, but also the improvement of rural school and church facilities, of rural roads and other means of communication, and such provision for community life and coöperative action as shall make rural life fully satisfactory financially, intellectually and morally.

It is to help in securing the accomplishment of such objects that we have inaugurated in Alabama a plan for County Agricultural Advisory Committees composed of a few leading spirits, in order to initiate new lines of effort and to coördinate all forces now at work in the field.

Briefly stated, the plan is to form a county advisory agricultural committee to consist of from six to ten men, representing particularly the banking, mercantile, farming and educational interests, through the appointment on the committee of at least one representative from each class; that is, a banker, a merchant doing a large advancing business, a large and successful planter or landowner—someone who is thoroughly familiar with the best agricultural practices for fighting the weevil—in most cases the county demonstration agent—and the county superintendent of education. This committee may be selected through a mass meeting, or organized under the initiative of a board of trade, or in almost any other way. The general purpose of the committee is to consider and recommend and foster all general movements looking for agricultural or rural betterment. Naturally, those things which are of immediate importance in the campaign against the boll weevil will receive first attention. The committee considers all local conditions and recommends a general plan of action and certain definite purposes for business men to keep working toward, while safe-

regarding the financial interests of both themselves and their customers. The educational campaign will be extended through the holding of joint meetings throughout the county, at which some of the most successful local men may tell what they have found from actual experience to be most feasible and profitable in that particular community. By cooperative action, the necessary agricultural and economic readjustments can be made gradually, but at a rate that will offset the increasing capacity of the weevil for damage, which usually reaches a maximum about the third year after the infestation begins. In this way the total value of farm products can at least be maintained, better agricultural practices inaugurated and prosperity most certainly increased. Labor must be retained, bad accounts avoided and foreclosures of mortgages prevented, also, if success is to be achieved in this campaign.

At its recent state convention the Alabama Bankers' Association unanimously and enthusiastically voted to support this movement and work along this line is a leading feature in the work of that association this year. There is no measuring the possible good that may result from this movement. By it the value of the Farm Demonstration Work, for instance, can probably be doubled in one year with very slight additional expenditures. Much, however, depends upon local initiative and leadership, and the leaders in this movement must have a clear vision as to the possibilities of Southern agriculture under the application of the best methods of farming with diversified crops and increased stock. They must realize the full capacity for damage of the boll weevil and must be willing to face the situation with frankness, but with unflinching courage and faith in their ability to make the fight against the weevil successfully.

PRESIDENT P. J. PARROTT: This is certainly one of the most interesting phases of committee work on a large scale. If there is no discussion we will now take up the paper by Mr. George A. Dean on "Grasshopper Control Work in Western Kansas."

GRASSHOPPER CONTROL WORK IN WESTERN KANSAS

By GEO. A. DEAN, *Entomologist, Kansas State Agricultural College and Experiment Station*

For several years the native grasshoppers, the most common species of which were *Melanoplus differentialis*, *Melanoplus bivittatus* and *Melanoplus atlantis*, had steadily increased in numbers over the western counties of Kansas, and in many of the counties did a large amount of damage to the crops. In the early fall of 1912, conditions were

very favorable for the females to oviposit, and the dry, mild winter which followed enabled fully 90 per cent of the eggs to pass the winter uninjured. In the spring the investigations of the field agents of the Department of Entomology of the Kansas State Agricultural College and Experiment Station and the district farm demonstration agents, together with a large number of reports from various parts of the state, showed that enormous numbers of the hoppers were hatching out and that it was very probable that the farmers of western Kansas would experience the most serious outbreak of grasshoppers known in that part of the state, unless prompt and vigorous efforts were made to put in operation methods effective in destroying them.

Three years ago the Department of Entomology realizing that not only were the grasshoppers increasing in alarming numbers, but also that they would be doing enormous damage to the crops, stationed Mr. Francis B. Milliken,² assistant entomologist, in the field to study the situation and develop effective methods for the control of the hoppers and demonstrate to the farmers that they could protect their crops. In this work it was found that poisoned bran mash, the hopper dozer, and poultry and young hogs were very efficient measures for the control of the grasshoppers.

Several of the recommended formulae for the preparation of the poisoned bran mash were used, but after thoroughly testing several of the various ones, Mr. Milliken recommended the following formulae as containing the quantities of the various ingredients that proved most efficient and could be most conveniently handled:

Formula:

Bran.....	20 lbs.
Paris green.....	1 lb.
Syrup.....	2 qts.
Oranges or lemons.....	3 fruits
Water.....	3½ gals.

Preparation and distribution:

Mix the bran and Paris green thoroughly in a wash tub while dry. Squeeze the juice of the oranges or lemons into the water, and chop the remaining pulp and the peel to fine bits and add them to the water. Dissolve the syrup in the water and wet the bran and poison with the mixture, stirring at the same time so as to dampen the mash thoroughly.

¹ The district farm demonstration agents are state and government men. They are farm advisers and work under the direction of the Kansas State Agricultural College.

² Mr. Francis B. Milliken was assistant entomologist of the Kansas Experiment Station for the two years previous to September 1, 1912, and is now with the Bureau of Entomology, United States Department of Agriculture.

The bait when flavored with oranges or lemons was found to be not only more attractive, but also more appetizing, and thus was eaten by more of the grasshoppers.

The damp mash or bait should be sown broadcast in the infested places early in the morning, or about the time the grasshoppers are beginning to move about from their night's rest. It should be scattered in such a manner as to cover five acres with the amount of bait made by using the quantities of ingredients given in the above formula. Since very little of the bran mash is eaten after it becomes dry, scattering it broadcast in the morning, and very thinly, places it where the largest number will find it in the shortest time. Sowing it in this manner also makes it impossible for birds, barnyard fowls, or live stock to secure a sufficient amount of the poison to kill them. On alfalfa fields, in order to secure the best results, the bait should be applied after a crop has been removed and before the new crop has started. Inasmuch as the poisoned bait does not act quickly, it will be from two to four days before the grasshoppers are found dead, and these will be more numerous in the sheltered places. It does not require much of the poison to kill them. Even a small portion from one of the poisoned flakes will be sufficient to cause death.

Last spring, early in the season the Department of Entomology sent out advance notices and circulars of warning, stating how favorable the conditions had been for the female grasshoppers to oviposit, and how the mild, dry winter had enabled fully 90 per cent of the eggs to pass the winter uninjured. This information was published in all the farm journals and nearly every daily and county newspaper in the state. Later, the department not only sent out another warning, stating that the hoppers had hatched out in enormous numbers, and that they were already seriously injuring crops, but also sent two men to demonstrate the practical methods of control. Three district farm demonstration agents were also busy in urging the farmers to prepare to fight the grasshoppers that were already devouring their crops. Many farmers, and in one place the entire county, put into operation the methods recommended and profited thereby, but the great majority either paid no attention to the warning or failed to put the methods of control in operation at the opportune time; that is, while the grasshoppers are young or are just migrating into the cultivated fields, and thus they soon found themselves facing the most serious outbreak of grasshoppers known in their part of the state. They were now compelled either to destroy the almost fully grown hoppers or allow them to completely devastate their crops, kill their orchards and destroy their shade trees. The farmers were now crying for help. Mr. G. E. Thompson, the district farm demonstration agent of Southwest Kansas,

succeeded in getting Ford County to organize for a systematic fight. The county commissioners realizing the seriousness of the situation, agreed to appropriate money out of the county funds to furnish free poisoned bran mash for every farmer in the county. The county was organized through the township trustees, every trustee being held responsible for the work in his township. The governor of the state was requested to urge upon the county commissioners of the adjoining county to cooperate in the work. Monday, July 14, was set as the "grasshopper day." The county commissioners had distributed over the entire county the following printed circular:

GRASSHOPPER FIGHT NEXT MONDAY

"In view of the alarming numbers in which grasshoppers are appearing in Ford County, and the untold damage which they are causing to growing crops, the board of county commissioners has appointed Monday, July 14, as the date on which to make a united and determined effort throughout all the townships of the county to destroy the pests as completely as possible.

"In order to enlist the help of every farmer in the county, in one big effort to exterminate the grasshoppers on that day, we have directed the trustees in every township to purchase at county expense the supplies which are needed in his township for poisoning the grasshoppers, using the formula which the State Agricultural College has found to be most effective.

"We appeal to every farmer, every landowner and every tenant to take up this matter at once with the trustee of their township who will furnish all the supplies and have charge of the work in that township. The situation demands that we deal with this pest promptly and effectively. Please get in touch with your trustee at once by telephone or otherwise, find out where you are to go to get the materials and interest all your neighbors in the campaign.

"Get your supplies in time so that you will be ready to spread the bait early Monday morning before the grasshoppers have begun to move.

"This is one of the most serious situations Ford County has faced for several years. We must have every farmer in the field early next Monday morning if we get the best results. All that remains for the farmer to do is to go to the trustee and get the materials which the county is furnishing and spread them on the infested fields. Please give every assistance in your power.

G. W. ARTWEIN, W. J. DAVIES, C. R. ATEN, *County Commissioners.*"

This summons was electric in effect. It was as if an army were moving on the country. Farmers who had stood helplessly by watching hordes of grasshoppers devour field after field and even orchards and shade trees, now assumed a fighting attitude. The plan proposed by the demonstration agent met with the approval of all. Every township trustee was to call by telephone or see personally every farmer in his district and tell him where to call for his portion of the poison. Distributing points were established at four towns in the county. The poisoned bran mash used was to be made and distributed according to the plan recommended by the Department of Entomology. It was

the poisoned bran mash that had proved so successful the two previous summers. Four days before the poison was to be distributed the writer took the field personally to conduct the campaign.

So well organized was the work, and so perfect the cooperation, credit for which should be given Mr. G. E. Thompson, the district demonstration agent, that two days before the time set as "grasshopper day" the county commissioners had the material on hand, and the township trustees had their forces marshaled and ready for the night. Within the next three days supplies were distributed to the farmers sufficient to prepare nearly one hundred tons of poisoned bran mash. All day long hundreds of farmers came for their allotment of the material. One or two representatives from the Agricultural College or the University of Kansas were at each place to explain how to mix and distribute the poison. The Paris green and bran were mixed at the distributing stations, but the syrup, oranges and water were not to be added until it was ready to put out in the field. A printed circular describing the method of preparing the poisoned bran mash, together with the method of distribution, was given to every farmer, so if he forgot the instructions of the college men he would have the directions in the circular. The circular also described in detail the other methods of control. A county official checked out the poison at each place. A two hundred-pound allotment was given each farmer, providing, of course, he had use for that amount. Of course this amount was not sufficient for the farmer who had several hundred acres of crops to protect. However, the county officials felt that it was enough fully to demonstrate to him that the poison was efficient, and after he was convinced the hoppers could be destroyed and his crops saved, he would be willing to buy additional material for distribution over the remaining fields of his farm. Although the writer knew the poisoned bran mash had proved successful where it had been used on a small scale the two previous summers, and had persuaded the farmers and county officials that it was no experiment but just a piece of demonstration work, he could not help feeling anxious as to what the result would be. Over one thousand farmers in a single county had taken home the poison. Reporters from several of the leading daily papers were there to write up the result. Several other counties were waiting to either organize to distribute poisoned bran mash, or join in the criticism of the college. A number of persons, such as you always find when doing work of this sort, were waiting for an opportunity to severely criticise the work. Meanwhile the farmers had distributed one hundred ton of poison. Thus Ford County and all of us rested and waited. The grasshoppers ate and so venomous were they for the poisoned bait that they even left their

choicest green food. In two days the poison had done its work. Investigations and reports from all over the county showed that from 60 to 70 per cent of the grasshoppers had been killed by the first application. Counts made in alfalfa fields of average infestation, showed from one hundred and fifty to two hundred and fifty dead grasshoppers per square foot. In many places under a single tree there was a peck of dead hoppers, and along hedges the ground directly under the hedge was completely covered, and in some places they were actually piled up two and three deep. In other words, the results were far better than anyone could have expected.

The grasshopper control work did not stop with Ford County. It was now an easy matter to organize, and eleven other western counties followed the example of Ford County in quick succession. In each of these counties the ingredients were furnished by the county and the same method of organization was used. The results were equally as good, and in some cases better. For instance, in Pawnee County where one hundred and twelve tons of the poisoned bran mash were distributed, fully 80 per cent of the grasshoppers were killed, and in Ellis County where one hundred and sixty-eight tons were distributed, one hundred and twenty tons of which were distributed in a single day, almost 90 per cent of the grasshoppers were destroyed.

The following report of the amount of poisoned bran mash used in the grasshopper control work is taken from the reports of the county officials:

AMOUNTS OF POISONED BRAN MASH USED

County	Area in sq. mi.	Amount furnished by the county— Tons	Amount furnished by individuals— Tons	Total—Tons
Ford.....	1,060	95		95
Kearny.....	848	28		28
Finney.....	1,240	70		70
Hodgeman.....	864	28		28
Gray.....	852	60		60
Edwards.....	600	28	28	56
Pawnee.....	744	74	38	112
Ellis.....	895	168		168
Trego.....	900	14		14
Rawlins.....	1,080	38	20	58
Scott.....	720	28		28
Gove.....	1,080	54		54
Other N. W. counties.....	600		60	60
Other S. W. counties.....	500		40	40
Total.....	11,953			874



Fig. 1. Grasshoppers destroying a cornfield; only the bare stalks remain.



Fig. 2. Farmers getting their allotment of poisoned bran mash, Dodge City.



Carolina poplar defoliated by grasshoppers.

Such excellent coöperation was had from all the farmers and county officials and so well organized was the work that it lasted only two weeks. Six representatives from the Agricultural College, three district farm demonstration agents, one representative of the Bureau of Entomology, United States Department of Agriculture,¹ and four representatives of the University of Kansas, coöperated in the work.

The entire work was an excellent example of coöperation, and demonstrated what can be done when farmers, merchants, bankers, millers, college men, farm demonstration agents, government men, and county officials get together.

Although the farmers in western Kansas experienced last summer the most serious outbreak of grasshoppers known in that part of the state, they demonstrated that they were equal to the occasion. After they were once convinced they were prompt in organizing, and by putting into operation the methods of control recommended by the Agricultural College, they were successful in destroying the grasshoppers. At the close of the season the entomologists and the farm demonstration agents made a careful examination of the grasshopper situation and were convinced that there were fewer grasshoppers in western Kansas than there had been for many years. In fact, when we consider that the farmers of western Kansas fed to their grasshoppers almost a thousand tons or two million pounds of poisoned bran mash, it is no wonder that there is a scarcity of grasshoppers. From 60 to 80 per cent of the hoppers were killed by the poisoned bran mash. The remaining grasshoppers were so left to the mercy of the parasitic and predaceous enemies that only a few of them escaped.

PRESIDENT PARROTT: This paper has been very interesting. We have another on the same subject by Prof. S. J. Hunter, which we will have before opening the subject for discussion. [The author submitted the following in place of the verbal report. Ed.]

GRASSHOPPER CONTROL IN THE SOUTHERN DIVISION OF KANSAS

By S. J. HUNTER and P. W. CLAASSEN, *University of Kansas, Lawrence*

Seventeen years ago the first problem presented to the senior author when first he became officially associated with the University of Kansas was the native grasshopper problem in western Kansas. This

The writer desires to acknowledge the valuable coöperation of the Bureau of Entomology, United States Department of Agriculture. Mr. Harrison Smith, assistant entomologist, United States Department of Agriculture, helped very much in organizing counties in Northwest Kansas.

was in a letter from Secretary Coburn of the State Board of Agriculture transmitting a number of letters from alfalfa growers in the western part of the state. Accordingly the department fitted out an expedition which spent three seasons in camp in the alfalfa fields of western Kansas. Results of this work were given in three bulletins of the department of entomology.¹

Discing of alfalfa in early spring was here first advocated as an effective means of destroying the grasshopper eggs and as well increasing the forage yield. From time to time as occasion required this problem has been followed. On June 6, 1913, Mr. A. J. Spangler, then assistant state entomologist, began work in Ness, Ford and Gray counties, giving special attention to the fungous disease then prevalent among the nymphs. Mr. Spangler continued his experimental work on this until he resigned July 1, 1913, to become state inspector of Minnesota, and was immediately succeeded by the junior author of this paper.

The University has responded to requests for entomological work from all parts of the state from 1872, at which time Dr. Snow was made chairman of the entomological commission of the Kansas Academy of Science, until 1907. In this latter year the state legislature created an entomological commission, the scope of whose work is in accordance with Section 4 of the Law creating that commission as follows: "That it shall be the duty of said state entomologists, under the control of the state entomological commission, to seek out and suppress pernicious insect pests and injurious and contagious plant diseases hereinbefore mentioned as destructive to the horticultural and agricultural interests of this state, and conduct experiments when necessary to accomplish that end."²

This commission shortly after the enactment of the law divided the state as shown in a map published in the first annual report of the

¹Dept. Conth. No.

31-1897—The More Destructive Grasshoppers of Kansas. Bul. Dept. of Entomology, Oct., pp. 1-111 pls. I-IV. F. H. Snow and S. J. Hunter.

35—Parasitic Influence on *Melanoplus*. K. U. Quarterly, VII, pp. 205-210, Oct. figs. S. J. Hunter.

38-1899—Alfalfa, Grasshoppers, Bees, Their Relationships. Bul. Dept. Entomology, pp. 1-164, pls. I-XIII, figs. 1-59. S. J. Hunter.

In addition to these three taxonomic papers were prepared as follows:

47—The *Melanoplus* of Kansas. Part I, Psyche, vol. IX, pp. 63-64, June, 1900. S. J. Hunter and W. S. Sutton.

48—The *Melanoplus* of Kansas. Part II, Psyche, vol. IX, pp. 76-78, July, 1900. S. J. Hunter and W. S. Sutton.

49—The *Melanoplus* of Kansas. Part III, Psyche, vol. IX, pp. 88-9, August, 1900. S. J. Hunter and W. S. Sutton.

²Chapter 386, Kansas Session Laws of 1907, Sec. 4.

commission for 1907 and 1908. Since that time all the University's entomological work along economic lines has been confined to the part of the state assigned to the state entomologist of the University of Kansas by the entomological commission.

Therefore, from the numerous requests received this season from counties in the University's district, it was evident that vigorous measures were being called for. Accordingly, the authors formulated a campaign in conjunction with the county commissioners with the coöperation of the following members of the department force: Assistant Professor Hungerford, Assistant W. T. Emery, Field Assistant A. E. Mallory, Assistant Dwight Isely, and Professor W. B. Wilson, head department of biology, Ottawa University, an appointee of the commission for this work. All these men are university graduates of several years standing and with two or more years' experience in entomological field work.

The organization of the counties in the University's territory was accomplished by holding a mass meeting called by the county commissioners at which one or more of the University's entomologists were present to give details of the organization and direct the work.

At this meeting a certain day was designated as Grasshopper Day when every man in the county was enlisted in the fight. The township trustees of each township were instructed to issue to each farmer a certain amount of the poison and the University entomologists were there to direct its application and record results. Practically every farmer in these counties availed himself of the opportunity to destroy the grasshoppers on his place in this way.

The formula used is given below. Since the formula used by Professor Dean of the State Agricultural College, with whom we worked in two counties, differed from ours as first published in the use of oranges instead of lemons and an additional amount of syrup, we, at his suggestion, to avoid confusion among the farmers, added the oranges to make the formulas uniform. Our experiments, however, show that the use of lemons is 40 per cent more effective than the use of oranges. In fact we have found that vinegar has proven as effective as oranges. The use of oranges shows no appreciable difference in the attractiveness of the bait, as compared with plain bran mash.

The commissioners of the various counties concerned entered heartily in this work and not only furnished the poison but furnished circulars, samples of which may be obtained by interested parties on application to the author.

In addition to this the University distributed 5,000 circulars of instructions over its territory.

The following is the formula which was recommended:

2½ lbs. Paris Green or White Arsenic.

50 lbs. Bran.

Mix these dry.

II

6 oranges, or lemons, chopped up fine, rind and all.

4 quarts syrup.

5 gallons water.

Mix these three together thoroughly.

Mix I and II., then add sufficient water to make a wet mash.

CAUTION:—Do not add water until the day the poison is to be distributed.

Early in the morning between 5 and 7 o'clock this poisoned bran should be scattered broadcast in the infested areas. It is of great importance to get the poison out early as the hoppers eat it better when first beginning to feed.

SUMMARY OF RESULTS

County commissioners of the following counties coöperated on the above plan and furnished the several amounts set opposite their names:

Finney, Garden City—4,000 pounds Paris green—40 T. bran.

Gray, Cimarron—1,700 pounds Paris green—17 T. bran.

Hodgeman, Jetmore—1,000 pounds Paris green—10 T. bran.

Ford, Dodge City—4,500 pounds Paris green—45 T. bran. (The Santa Fé, the Federal Bureau, the College, and the University worked together here.)

Scott, Scott—1,000 pounds arsenic—10 T. bran.

Kearney, Lakin—2,500 pounds Paris green—25 T. bran.

Edwards, Hinsky—(The same forces worked here as in Ford County).

Pawnee, Larned—(Professor Dean of the college took full charge here).

Mcade County—1,500 pounds Paris green—30,000 pounds bran.

In the following counties the entomologists of the University gave individual assistance to the farmers:

Hamilton,	Ness,
Wichita,	Lane,
Pratt,	Stafford.
Barlow,	

The morning was found to be the best time to apply the mixture. It does not dry as fast then and the grasshoppers are more eager for food, and are, therefore, more easily attracted to it. When scattered broadcast, using three to five pounds of the mixture to the acre, the danger of poisoning fowls is eliminated.

Chickens eating the poisoned hoppers do not appear to be affected

The poisoned hoppers do not seem to take enough poison to affect the cannibalistic brethren who are wont to devour their poisoned kind.

Actual counts showed that after the bran mash once became dry it lost its attractiveness and thereby its effectiveness. This is another reason advanced for early morning application.

Since under ordinary weather conditions the bran dries out in about two hours, distributing the mash in little balls or piles was tried. It was found, however, upon experiment, that the sowing of the bran mash broadcast was more effective for the following reasons:

- a. It eliminates all danger of poisoning fowls or stock.
- b. Covers more than twice as much area and thereby reaches more hoppers.
- c. After the outer surface of the bran-mash ball has once become dry it is not eaten even though the inside may still be moist.
- d. With the same amount several applications may be made at intervals of two to four days thereby reaching more hoppers.

Observation counts showed that 40 to 60 per cent of the grasshoppers were killed with one application of the poison. A second application destroyed from 70 to 80 per cent of the grasshoppers.

Investigations in comparison with checked fields after the 25th of September showed that there were less than half as many living hoppers on the field where poison had been scattered than on checked fields where no poison had been applied.

Sarcophagid parasites were unusually active throughout the region.

The locust fungus was unusually active in four counties in the early spring but with the dry weather it practically disappeared. All attempts at artificial distribution were without avail.

It would seem almost impracticable to distribute poison in a green alfalfa field where there is abundance of feed for the hoppers and yet, from figures based on actual counts, about two hundred and forty thousand grasshoppers were killed per acre with one application right in the midst of a large green alfalfa field. Poison for this experiment was scattered broadcast through the field, using four to five pounds to the acre at an actual cost of not over twelve cents per acre.

A more effective means, however, is the mowing of the field, leaving strips of standing alfalfa four to six feet wide and about seventy-five yards apart. The grasshoppers soon collect in these strips and are thus readily poisoned with small amounts of the bran mash or easily caught with the hopperdozer.

By the use of these means one of the largest alfalfa growers in the southwest was able to harvest three crops of alfalfa before the first of August where in a check field nearby only one crop was harvested in the same time and that the first crop.

EXPERIMENTAL WORK ON ATTRACTIVENESS OF VARIOUS POISON MIXTURES

Experiments to determine the attractiveness and effectiveness of a number of poison baits were made. The sites chosen for such experiments were bare of vegetation but rich in green vegetation twenty-five to one hundred feet away.

For example beds of dried up ponds and unused bare irrigation ditches were used. In such situations the grasshopper could readily be observed descending from the food plants and marching directly to the poison.

The general mixture of bran, Paris green, and syrup was used, lemon, anise oil, stale beer, and vinegar were added to separate portions respectively. On further experiment, plain bran and Paris green and plain bran with syrup were used to check results.

The object of these experiments was to find, if possible, a cheaper product to take the place of the expensive lemon, using vinegar, if possible.

Beginning with the lemon mixture and following it by anise oil, stale beer, and vinegar mixtures respectively, these were put out separately in a series of portions, about a teaspoonful in a place. Counts were then made of the number of hoppers attracted to the various baits and recorded as follows:

EXPERIMENT 1

Showing number of hoppers attracted to individual baits

These counts were made at intervals of twenty to thirty minutes.

Count No.	Lemon			Anise Oil			Stale Beer			Vinegar		
	1	2	3	1	2	3	1	2	3	1	2	3
Pile No. 1	11	15	3	1	8	1	3	7	0	1	7	0
Pile No. 2	8	14	2	4	11	2	5	7	0	4	6	0
Pile No. 3	8	6	0	1	6	3	3	4	0	4	3	0
Pile No. 4	4	9	7	3	3	2	3	2	0	3	2	0
Pile No. 5	7	4	1	3	1	0	3	2	0	2	4	0
Pile No. 6	5	4	0	4	1	1	3	1	0	3	4	1
Pile No. 7	6	6	0	6	4	0	2	0	0	2	5	0
Pile No. 8	2	8	1	3	2	1	3	3	0	2	2	1
Pile No. 9	12	11	2	3	1	0	6	0	1	1	1	1
Pile No. 10	8	3	7	3	3	1	2	4	0	0	1	0
Pile No. 11	2	6	5	5	5	6	2	0	4	2	4	10
	73	86	28	36	45	17	35	30	5	26	39	13

Total number of hoppers attracted by various baits:

Lemon, 187

Anise oil, 98

Stale beer, 70

Vinegar, 78

The third count shows the comparatively small number of hoppers attracted after the bait had dried out.

EXPERIMENT 2

This experiment was made in the alfalfa stubble along the edge of a field that had not yet been cut.

The table again shows the number of hoppers attracted to individual baits.

Counts made at intervals of twenty to thirty minutes.

Count No.	Lemon		Anise Oil		Stale Beer		Vinegar		Plain Mixture		Plain Syrup	
	1	2	1	2	1	2	1	2	1	2	1	2
Pile No. 1	3	1	5	0	3	1	4	1	6	2	4	1
Pile No. 2	12	4	6	3	1	3	2	0	9	4	7	0
Pile No. 3	5	4	3	1	6	4	4	1	4	4	8	2
Pile No. 4	6	4	8	7	6	2	4	0	4	1	6	1
Pile No. 5	11	2	6	1	4	4	3	2	9	1	6	2
Pile No. 6	9	3	8	3	3	0	2	1	2	1	7	3
Pile No. 7	7	5	5	3	3	2	4	4	4	3	7	1
Pile No. 8	10	5	5	4	5	1	1	1	6	2	5	3
	63	28	46	22	31	17	24	10	44	18	50	13

Total number of hoppers attracted by various baits:

Lemon, 91

Vinegar, 34

Anise oil, 63

Plain mixture, 62

Stale beer, 48

Plain syrup, 63

The plain mixture column contains only bran, Paris green, and water.

The last column contains syrup in addition to the plain mixture.

These were put out as checks.

EXPERIMENT 3

This experiment was made at same time and of the same mixtures as No. 2, but placed on bare ground near green vegetation.

Count No.	Lemon		Anise Oil		Stale Beer		Vinegar		Plain Mixture		Plain Syrup	
	1	2	1	2	1	2	1	2	1	2	1	2
Pile No. 1	4	11	7	8	3	3	9	4	8	3	7	1
Pile No. 2	12	6	7	2	3	4	3	2	13	4	3	3
Pile No. 3	6	4	7	7	5	4	8	6	9	3	8	2
Pile No. 4	5	1	9	4	3	2	4	3	6	6	3	4
Pile No. 5	2	3	3	0	3	2	3	2	3	4	4	2
Pile No. 6	8	4	6	4	6	3	7	3	12	5	4	3
Pile No. 7	16	11	6	6	3	2	10	2	7	5	3	3
Pile No. 8	12	8	8	5	3	4	5	1	4	6	9	5
	65	48	53	36	29	24	49	23	62	36	41	23

Total number of hoppers attracted by various baits:

Lemon, 113

Vinegar, 72

Anise oil, 89

Plain mixture, 98

Stale beer, 53

Plain syrup, 64

EXPERIMENT 4

These mixtures were put out in the center of an irrigating ditch, eight to ten feet away from all vegetation.

	Lemon			Anise Oil			Stale Beer			Orange			Vinegar			KCN	
Count No. 1.....	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2
Pile No. 1.....	10	9	6	1	6	5	9	8	8	3	5	2	1	4	7	0	0
Pile No. 2.....	5	5	3	4	6	3	3	4	6	4	1	2	4	6	2	0	0
Pile No. 3.....	9	8	3	4	2	6	2	2	3	6	9	3	1	6	3	1	0
Pile No. 4.....	7	4	2	6	4	1	2	3	1	7	2	3	7	5	1	0	0
Pile No. 5.....	2	1	1	6	9	6	2	2	4	7	5	3	3	4	5	0	1
Pile No. 6.....	8	14	9	2	3	2	15	7	10	4	2	2	14	6	5	0	0
Pile No. 7.....	12	8	8	8	6	3	15	7	5	15	4	5	17	9	7	0	0
Pile No. 8.....	23	14	7	10	12	5	12	14	5	21	10	11	10	8	5	0	0
Pile No. 9.....	14	9	7	7	4	5	21	7	5	5	4	6	26	14	6	0	0
Pile No. 10.....	8	18	4	10	13	2	17	13	5	15	5	3	11	5	3	0	0
Pile No. 11.....	26	7	6	17	11	2	12	4	3	3	10	4	2	15	4	0	0
Pile No. 12.....	18	9		10	4		16	8		7	5		5	4		1	1
Pile No. 13.....	8	7		4	2		8	2		8	3		6	2		0	0
Pile No. 14.....	6	4		11	5		10	1		6	3		9	4		0	0
Pile No. 15.....	7	5		5	3		7	3		5	2		7	3		0	0
Pile No. 16.....	8	5		8	3		8	5		3	9		8	1		0	0
Pile No. 17.....	15	8		4	2		15	2		4	3		2	1		0	0
Pile No. 18.....	18	9		4			12	6		7	6		4	2		0	0
Pile No. 19.....	16	3		4	2		10	10		11	2		4	2		0	0
	124	193	106	131	65	110	157	92	90	110	67	95	127	67	1	2	5

Total number of hoppers attracted by various baits:

Lemon, 423	Orange, 267
Anise oil, 271	Vinegar, 284
Stale beer, 350	KCN, 6

EXPERIMENT 5

	Lemon		Anise Oil		Stale Beer		Orange		Vinegar		Plain		Plain Syrup	
Count No. 1.....	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Pile No. 1...	4	4	6	1	14	1	3	1	6	2	12	2	9	0
Pile No. 2...	6	4	5	2	5	3	2	1	7	1	11	2	8	4
Pile No. 3...	10	6	4	2	8	3	2	3	3	2	8	3	13	2
Pile No. 4...	4	5	4	0	6	3	2	1	2	1	2	1	3	2
Pile No. 5...	5	3	6	2	5	5	4	1	6	4	3	2	10	3
Pile No. 6...	7	4	7	2	6	9	7	2	11	2	5	2	8	1
Pile No. 7...	13	5	6	2	2	2	6	2	4	1	13	4	16	6
Pile No. 8...	12	5	10	5	3	2	2	2	5	2	8	1	4	8
Pile No. 9...	9	1	8	3	8	5	3	4	3	5	4	1	7	1
Pile No. 10...	18	8	4	3	5	1	2	4	2	0	10	6	16	7
Pile No. 11...	11	4	1	3	2	2	7	5	2	7	5	1	7	1
Pile No. 12...	8	2	3	5	11	5	7	0	14	0	5	4	6	2
Pile No. 13...	16	5	7	4	5	1	9	4	6	1	4	2	5	1
Pile No. 14...	5	2	3	1	10	1	10	3	6	1	7	3	6	3
Pile No. 15...	2	5	8	2	9	6	7	4	5	3	9	3	14	1
Pile No. 16...	3	2	3	0	4	2	4	1	9	1	4	5	4	6
Pile No. 17...	5	1	4	5	6	2	2	2	1	2	6	2	9	2
	137	66	89	42	106	53	79	40	91	35	125	44	145	40

Total numbers of hoppers attracted by various baits:

Lemon, 203	Vinegar, 126
Anise oil, 131	Plain mixture, 169
Stale beer, 159	Plain syrup, 185
Orange, 119	

In this count the additional ingredients added to plain bran poison mash made no appreciable difference in the attractiveness of the bait. The potassium cyanide was tried in place of Paris green, but proved to be a complete failure. The hoppers would not eat the bait containing KCN.

SUMMARY OF PRECEDING DATA

	Total number of Portions of Bran Put Out	Total Number of Hoppers Attracted	Average Number of Hoppers for Each Pile of Bran
Lemon	148	1,016	6.8
Anise Oil	148	634	4.4
Stale Beer	148	680	4.59
Vinegar	148	594	4.0
Orange	93	386	4.1
Plain Mixture	66	329	4.9
Plain Syrup	66	312	4.8

The lemon, therefore, seems to be about 26.5 per cent more effective than any of the other ingredients tried. As the foregoing experiments show, however, very good results can be obtained with the plain bran Paris green mash alone.

All the above experiments show that the grasshopper has a keen sense of smell and is easily attracted to the bait put out for it.

In one instance a little of the mixture (about a teaspoonful) containing the lemon in it, was placed in the middle of the road where no vegetation was present and the distance measured from which the hoppers were attracted. Several minutes after the bait had been put out, the hoppers were seen leaving the thistles and crawling for their newly prepared breakfast. Soon the congregation around the "table" numbered between sixty and seventy. A photograph (see plate 3, fig. 1) was taken of the "boarders coming for breakfast" but many of them were scared away while a number of the others turned "right about face."

The distance between the bait and a large thistle from which twelve to sixteen hoppers came was then measured and found to be fifty feet. It seems remarkable that the sense of smell should be so keenly developed in the grasshopper.

METHODS OF OVIPOSITION BY *M. DIFFERENTIALIS*

The usual text and figures have shown a recurved position of the abdomen when illustrating the method of oviposition in grasshoppers. Milliken,¹ however, has described the position of *M. bivitatus*, *D. carolina*, and *S. shoshone*. In his accompanying figure, the abdomen and cavity is shown protruding greatly beyond the tips of the tegmina. This is also described by W. D. Hunter.²

In an examination of twenty-one *differentialis* made during oviposition by the junior author, no abdomen or excavation was found to extend perceptibly back of the tegmina.

The accompanying plate 4 serves to illustrate the various positions assumed by *M. differentialis* during oviposition.

It has been our observation that the *differentialis* locust does not begin to oviposit in this latitude before the first of October and this season was no exception. In the ground covered by short buffalo grass along the roadsides, or by paths through the alfalfa fields, are the places selected for oviposition by *M. differentialis*.

MR. HENRY SKINNER: I would like to inquire whether the use of oranges or lemons was original at this time, and I would also like to know if Professor Dean can give us any estimate of the value of the lemons and oranges in the mixture.

MR. GEORGE A. DEAN: The use of fruit juices is not original with the Kansas Experiment Station. It had previously been tested in California, but its use was not general. When we tried it two or three years ago we were convinced that it was very efficient. In case it is left out of the bran mash about 75 per cent of the efficiency of this material is lost. Fruit juices seem to attract the grasshoppers so that they will feed on the poisoned bait. They will leave green corn and feed on the poisoned bran mash. It seems to be more appetizing.

MR. R. A. COOLEY: What kind of syrup is used?

MR. GEORGE A. DEAN: I prefer common glucose syrup. We also get a considerable amount of beet sugar syrup from Colorado.

MR. WILMON NEWELL: I would like to ask whether or not you found this bran mash effective where the infestation was heavy and where the hoppers had an abundance of food?

MR. GEORGE A. DEAN: In a great many places the hoppers were in the corn and fresh food was very plentiful, yet they would leave the corn and also alfalfa and feed on the poisoned bran mash.

MR. E. P. FELT: I would like to ask if the weather conditions had any material influence in increasing the efficiency of the poisoned

¹ This Journal, Vol. 5, No. 2, page 232.

² California Bul. 170, 1905.



Fig. 1. The arrow points to a mass of grasshoppers attracted to a teaspoonful of the lemon poison. Others on the way turned back on the approach of the photographer.



Fig. 2. Grasshoppers descending the sides of an unused irrigation ditch to feed on remnants of poison in cans used for mixing the poison bait. Photo by P. W. Claassen.



1



2



3



4



5



6

Figs. 1-6. Photographs showing mode of oviposition in *Medonaplas differentialis*. Note that in no case does the abdomen or cavity extend back of tegmina. These insects were instantly killed in act of oviposition with prussic acid and lateral view exposed for photograph. Photograph by P. W. Claassen.

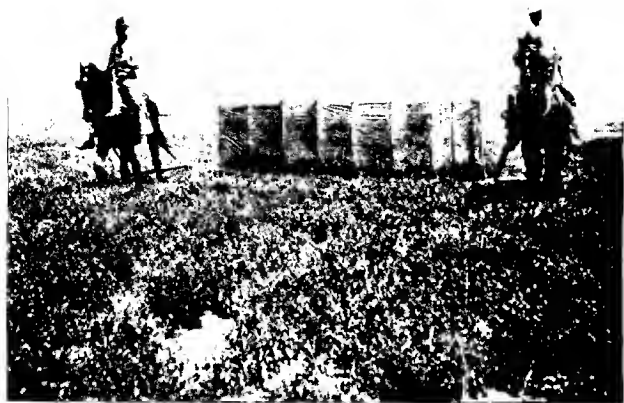


Fig. 1. Hopperdozer at work.

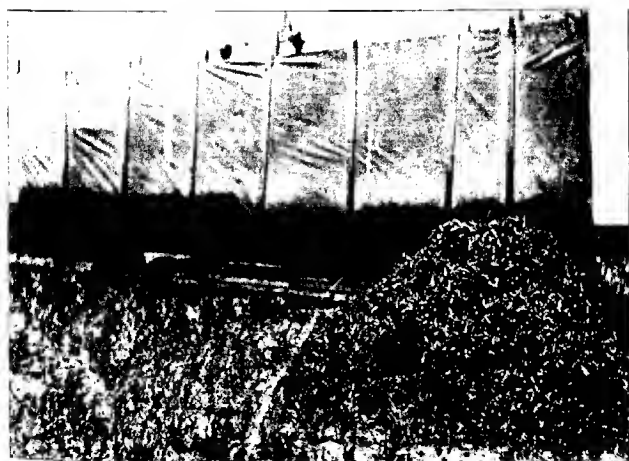


Fig. 2. One catch of grasshoppers. Photo by P. W. Claassen.

bran mash. Would it have been equally efficient if the foliage had been succulent?

MR. GEORGE A. DEAN: The drouth conditions in my opinion aided greatly. These grasshoppers had come two or three miles and were very hungry. It was very hot in Kansas and they sought shady places. They preferred to do their feeding in the shade and the drouth conditions aided greatly in getting the grasshoppers to the poisoned bran mash in shady places.

MR. J. G. SANDERS: Has a test been made of artificial or synthetic orange flavor? This material is very cheap.

MR. GEORGE A. DEAN: I have used extract of lemon and other things, but believe that if the orange fruit is ground up with the peelings, that it is more attractive to the hoppers.

PRESIDENT P. J. PARROTT: The next paper on the program is by Mr. Z. P. Metcalf on "Report of Field Work on the Southern Corn Bill Bug."

REPORT OF FIELD WORK ON SOUTHERN CORN BILL BUG

By Z. P. METCALF, *West Raleigh, N. C.*

(Withdrawn for publication elsewhere)

MR. A. F. CONRADI: I would like to ask Mr. Metcalf what he would recommend in practice to avoid the ravages of the corn root worm.

MR. Z. P. METCALF: In North Carolina, as far as my observations and experiments have gone, the dates for planting to avoid infestation of the corn bill bug coincide exactly with the dates for planting to avoid the corn root worm. Very early plantings seem to escape injury and the same is true of very late plantings.

PRESIDENT P. J. PARROTT: We will now have a paper by Mr. A. F. Burgess on "The Present Organization and Methods Used by the Bureau of Entomology on the Gipsy Moth Work."

OUTLINE OF THE WORK ON THE GIPSY MOTH AND BROWN-TAIL MOTH CONDUCTED BY THE BUREAU OF ENTOMOLOGY, U. S. DEPARTMENT OF AGRICULTURE

By A. F. BURGESS

For several years appropriations have been made by Congress for purpose of preventing the spread of the gipsy moth and the brown-tail moth from the infested region in New England to other parts of the United States. This work is being carried on by the Bureau of Entomology, U. S. Department of Agriculture, and its administration is in charge of the writer under the direction of Dr. L. O. Howard,

Chief of the Bureau. An office is maintained at 43 Tremont Street, Boston, Mass., which furnishes headquarters for the men under whose direction the different lines of work are conducted. A laboratory is maintained at Melrose Highlands, Mass., which serves as headquarters for receiving and disseminating collections of parasites and natural enemies of these insects and for conducting investigations and experiments, the results of which form a basis for work in the field. The entire work is being undertaken along the following lines:

1. Experimental Work.
2. Silvicultural Investigations.
3. Quarantine Work.
4. Scouting Work.

EXPERIMENTAL WORK

This work is being carried out under the supervision of the writer and at the present time several distinct projects are being investigated as follows:

- (a) Parasite Work.
- (b) Field Observation Work.
- (c) Food Plant Work.
- (d) Dispersion Work.
- (e) Disease Work.
- (f) Secondary Insect Work.

PARASITE WORK.—This work is in charge of Mr. J. N. Summers, and has for its object the introduction, breeding, and dispersion of the foreign parasites and predaceous enemies of these insects. It is necessary to make a critical study of the life history and habits of these beneficial species in order that they may be utilized to the best advantage. Much progress has already been made in this direction and several species have already become firmly established in this country, and are doing good work in reducing the increase of the pests concerned. A careful investigation is made each year to determine the increase and spread of the beneficial species and a great amount of valuable scientific data is being secured.

FIELD OBSERVATION WORK.—This is being supervised by Mr. C. W. Minott, and has for its object a determination of the natural increase of the gipsy moth under field conditions. Observation points have been selected, aggregating more than 200 in number, scattered throughout the infested region, and care has been taken to secure localities where there are different types of forest growth, different degrees of infestation, and where parasites have been introduced and where they do not exist. A careful study is made during the summer and fall and accurate records are kept of the increase or decrease of the species in these areas. Also a determination is made of the effect of defoliation

on the trees concerned. Areas are now under observation in Maine, New Hampshire, and Massachusetts.

FOOD PLANT WORK.—This work is in charge of Mr. F. H. Mosher, and is carried on during the summer at the laboratory in Melrose Highlands, Mass. Caterpillars of the gipsy moth are fed on selected food plants and accurate records are kept of their ability to survive and their preference for the different species of trees which are common in New England. A temporary sub-station for conducting a duplicate set of these experiments has also been maintained and during the past season was in charge of Mr. R. Wooldridge. The information secured by feeding the caterpillars of the gipsy moth in each caterpillar stage is carefully compared each year with the results of the observations made in the field points above mentioned, and information has already been secured which can be used for thinning woodlands so as to leave the trees which are least subject to attack.

DISPERSION WORK.—This project is being carried on by Mr. C. W. Collins, and consists of an extensive study of the factors responsible for the natural and artificial spread of the gipsy moth. A large amount of data has been secured on the temperature and field conditions most favorable for the spread of this insect, and it has been demonstrated that the newly hatched caterpillars can be carried long distances by the wind.

DISEASE WORK.—Investigations on the wilt disease, which attacks the gipsy moth caterpillars and destroys large numbers of them in wild infestations, are being conducted in coöperation with the Bussey Institution of Harvard University. A large number of experiments are being conducted at that Institution by Mr. R. W. Glaser, who is working under the supervision of Dr. W. M. Wheeler. Check experiments to determine the relation of food plants to the development of the wilt disease were carried on by Mr. J. J. Culver, and an extensive series of field observations was made by Mr. A. W. Young during the summer of 1913 to secure information concerning the relation of temperature and humidity to the development of the disease.

SECONDARY INSECT WORK.—In many sections where trees have been defoliated by the gipsy moth they are attacked by the bark borers. Oak trees suffer very seriously in this respect, and an investigation is being carried on in coöperation with Dr. A. D. Hopkins, who has charge of the branch of forest insects of the Bureau of Entomology, to secure more information along this line. Mr. H. A. Preston is working under his direction in making a study of the life history and habits of the principal boring insects concerned, and is carrying on a number of experiments to determine whether this pest can be controlled economically.

SILVICULTURAL INVESTIGATIONS

This work has been taken up in coöperation with the U. S. Forest Service and is being conducted by Mr. G. E. Clement. Its object is to determine the relative resistance to moth attack of different species of timber trees when grown under the best silvicultural condition. The method used in carrying on this work is to select different types of forest growth and put them into the best possible silvicultural condition. These plats are examined from time to time to secure information on the effect of such thinnings and to test the ability of different stands to survive gipsy moth attack. The results of these experiments will give valuable information as to the proper method of managing moth-infested woodlands.

QUARANTINE WORK

The territory infested by the gipsy moth and the brown-tail moth has been placed under quarantine by the Federal Horticultural Board, and regulations have been made providing for inspection of nursery stock and forest products that are shipped from the infested territory to other parts of the United States, in order to prevent the spread of these insects on such shipments. This work is in charge of Mr. D. M. Rogers, and all products of this sort that are shipped outside of the territory are carefully inspected. This protects the country at large and has resulted in preventing the spread of both the gipsy moth and the brown-tail moth to many widely separated sections of the United States.

SCOUTING WORK

This work is being carried on under the direction of Mr. L. H. Worthingley, and consists in the examination of the territory around the outside border of infestation. It serves to determine the territory which should be placed under quarantine from year to year. As much work as possible is done to clean up infested places in this outside territory, particularly along the western border, from which section the insect is most likely to spread to other parts of the country. Careful work is being done in several isolated colonies beyond the principal area of infestation, and in some places the insect has been exterminated before there was opportunity for further spread.

COÖPERATIVE WORK

Field work is being carried on in close coöperation with the work that is done in the infested states, and which is being paid for by state or local appropriations. Arrangements are made so as to prevent a duplication of work and in this way good results have been secured. Coöperation with the states has also been attempted with good results in introducing and checking up the work of the parasites and natural

emies of both moths, and during the past season arrangements were made at the request of the Entomologist of the Dominion of Canada so that parasitic material was collected in Massachusetts by its assistants and shipped to New Brunswick and Nova Scotia, in order to determine whether the species concerned would be useful in controlling the brown-tail moth which has become established there. Several shipments of parasitic material have also been sent to other parts of the United States, where serious insects occur and where it seemed probable that parasites would be useful in reducing the pests concerned.

MR. HENRY SKINNER: I would like to ask whether any stages of the gipsy moth have been found where it has not become established.

MR. A. F. BURGESS: I do not quite understand the question.

MR. HENRY SKINNER: Some time ago I had a full-grown gipsy moth larva brought to me for identification from Philadelphia, and this is the reason why I asked whether there have been other cases where single caterpillars have been found in territory where the species has not become established.

MR. A. F. BURGESS: I am very sorry that you did not report this case at the time so that we could have had the matter thoroughly investigated. Not long ago specimens of brown-tail moth webs were received from Philadelphia, but on investigation it was found that they came originally from an infested orchard in Maine.

It is possible for gipsy moth caterpillars to be shipped moderate distances and survive, and possibly this is what happened in the case which has been mentioned by Doctor Skinner. As a rule if one caterpillar is found on the property more will be located if a thorough investigation is made. I should be glad to get all information possible concerning this matter so that we can have it thoroughly investigated.

MR. HENRY SKINNER: This occurred several years ago and there is no way by which I can fix the date.

PRESIDENT P. J. PARROTT: We will now take up the next paper by Mr. Wilmon Newell entitled, "A Simple and Economical Method of Filing Entomological Correspondence."

A SIMPLE AND ECONOMICAL METHOD OF FILING ENTOMOLOGICAL CORRESPONDENCE

By WILMON NEWELL, *College Station, Texas*

The handling of correspondence is a necessary part of the work of the economic entomologist and by this means much valuable property is saved from destruction by insects. At the same time, it must be conceded that in offices or departments where the correspondence is

voluminous, it often bids fair to consume the major portion of the entomologist's time. Answering inquiries is legitimate work for the entomologist, but from his standpoint is not "productive labor" for the mere dissemination of entomological knowledge adds nothing new to the science. The entomologist who does nothing more than answer letters and compile popular bulletins does not increase the sum of our available knowledge of insects; research and experiment should constitute by far his most important work. The problem of handling office routine with sufficient speed to leave time for experimental work is constantly faced by nearly all entomologists, particularly by those connected with state institutions, and much of this routine is associated with the answering of the daily letters.

Heretofore but little attention seems to have been given to the methods of filing entomological correspondence, the entomologist using whatever plan or fixtures were available. Several years of experience with various commonly used filing systems convinced the writer that they were not adapted to the requirements of the entomologist.

For example, the vertical letter filing system requires that a folder be numbered and labeled for each correspondent, together with an index card similarly prepared. Both folder and card must be put in their proper places in the files, and the letters themselves must also be numbered and filed. The folders, index cards, transfer cases and filing cabinets for this system require expenditures which often seriously deplete the entomologist's available funds. Aside from the time and expense required to maintain this system, it is not adapted to the purpose, for many correspondents write but once in several years and for them the folders and cards must be indefinitely maintained in the files.

The alphabetical system of filing, wherein the alphabet is divided into many minor sub-divisions, such as "Aa to Ae" and "Aba to Abo," etc., is but little better. While it dispenses with the card index and its attendant work, the system still requires expensive furniture and is a system in which the chances for errors in filing are increased to a maximum because of the similarity of the many sub-divisions of the alphabet.

Four years ago the writer devised a system of letter-filing which appears to combine all the important advantages of other systems but which reduces clerical work to a minimum and the cost to a mere bagatelle. In fact, the cost of materials is less than the cost of the transfer cases for the vertical or alphabetical systems.

The filing is primarily by subject and for containing the letters we use the common pasteboard letter file containing sheets labeled A to Z. Neatly printed labels bearing the following titles are pasted to the backs of the files, one subject or title to each file.

ANTS	STAPLE CROP INSECTS
APICULTURE	ASSOC. OF ECONOMIC ENTOMOLOGISTS
COTTON INSECTS	BILLS & ORDERS
FRUIT & TRUCK INSECTS	CAMPUS
FOREST, SHADE & NUT TREE INSECTS	INFORMATION
FOUL BROOD	GENERAL

These files are kept in any convenient place, preferably on a table, and constitute the "active file," or group, in which the correspondence is filed from day to day (Plate 6). The letters, with the carbon copies of replies attached, are arranged by subject and then filed alphabetically under each subject, according to the name of the correspondent. One has but little difficulty in deciding under what subject any given letter should be filed. Thus, a letter concerning the onion thrips would be filed under "Fruit & Truck Insects," and one about Hessian fly in the file labeled "Staple Crop Insects." Occasionally a letter may be classed under any one of two or more subjects and to cover such cases certain simple rules must be adopted.

The nature of the correspondence falling in the classifications "Ants," "Apiculture," "Cotton Insects," "Fruit & Truck Insects," "Foul Brood," "Forest, Shade & Nut Tree Insects," and "Staple Crop Insects" is at once apparent.

The use of the remaining files is governed by the following general rules:

In the file labeled "Assoc. of Economic Entomologists" is placed correspondence with other members of the Association upon entomological matters of general interest, or regarding Association matters, but not regarding any specific insect problem.

The "Bills & Orders" file covers all correspondence relating to the ordering of supplies and the employment of labor, as well as correspondence relative to the settlement of accounts, payment of bills, etc. It does not, however, include correspondence which is concerned only with the matter of prices or the nature of supplies, apparatus, etc.; this being placed under "Information."

The file "Campus" takes all correspondence with parties located on the College grounds. This is virtually synonymous with such a term as "local correspondence."

Under the head of "Information" we file copies of all letters in which we request information from others, together with the replies to such letters. Under this head come such things as quotations on supplies, identity of specimens sent to other workers, etc. The file does not include anything in the way of information which we furnish to others.

The file "General" receives all correspondence which does not fall

within any of the other classifications. Contrary to what one would expect, the number of letters falling in this group is very small and most of them do not relate to entomological matters at all.

At the time the filing boxes are labeled notation of the date is made upon the back of the box. In addition to the subject labels on their backs, the filing boxes are also numbered. These numbers are consecutive for the files of the active group, but are independent of the subjects.

When any filing box becomes filled it is taken bodily from the active group and placed in the "transferred group," notation being made of this date upon the back of the file. Its place is taken in the active group by a new filing box, labeled with the same subject-label and with the number next succeeding the highest number already in use. At the same time the number of the new filing box is placed on the full box just transferred, the figure being written in ink just below the number already on the transferred box. In a similar manner, the number of the transferred box is placed on the new box, but *above* the number already on the latter. In the transferred group (Plate 6) the boxes are arranged according to subject. Thus the correspondence upon each subject is brought together for permanent preservation, and a glance at the numbers upon the back of any filing box shows what box immediately precedes it in the same subject and what one succeeds it. Thus a glance at filing box No. 537, in "Foul Brood," shows that the preceding box in this subject is No. 534 and the succeeding one No. 545. The inclusive dates upon the back of each filing box show the period covered by the correspondence therein.

At the time letters are written, the subject file and number are placed at the top of the letter but for brevity convenient abbreviations are used, such as "C. I." for "Cotton Insects" "F. & T." for "Fruit and Truck Insects," etc.

When filing, the clerk first sorts the correspondence to subject, then files the letters alphabetically in the corresponding pasteboard filing box.

Briefly stated, the advantages of this filing method are:

No index cards to prepare or file.

No folders to label or file.

No wood or metal filing cabinets required.

No transferring except the movement of the filing box from the active to the transferred file and the labeling of a new box to take its place.

Any subject may be discontinued or new subjects added, as may be desired, without interfering in any way with the operation of the system.

Any desired letter can be located as quickly in these files as in the case of any other system, for the correspondence is self-indexing under each subject. The question may arise as to how a letter would be found if one had forgotten the subject. In reply to this we may say that if the entomologist hasn't at least a vague idea of what the letter was about, he has little or no occasion to find it. In actual practice we do not have this difficulty and we also find that when a correspondent refers to some previous letter he invariably gives a clue to its subject-matter.

Perhaps the economy of this system is the strongest argument in its favor. The filing boxes cost us 25 cents each when purchased under the State Stationery Contract, while for \$2 we had enough subject labels printed to last about twenty years. As each filing box holds from 330 to 360 letters, it is seen that the total filing cost is about 75 cents per 1,000 letters. Saving the cost of index cards, folders and filing cabinets is not the only economy; much less time is required both for filing and finding letters than in the case of other systems.

This plan of filing would be as ill-adapted to the needs of the business man as his methods are to our line of work and it is the writer's opinion that we should use methods adapted to our needs rather than try to adopt the unsuitable methods of those in other professions. The letter-filing scheme I have attempted to describe is not a "new creation"; it has been in use in our office for the past four years, taking care of a correspondence of from 8,000 to 10,000 letters per annum and it has met all requirements.

Question: What do you do when a letter covers two subjects?

MR. WILMON NEWELL: We assign it to the subject which we consider the most important.

Question: Do you put in any references to letters of minor subjects so as to indicate where they are filed?

MR. WILMON NEWELL: We do if we think we will need to refer to these letters.

Question: How many letters do you handle in a year?

MR. WILMON NEWELL: We have been using this method for four years with an average correspondence of from eight to ten thousand letters a year.

PRESIDENT P. J. PARROTT: If there is no further business we will now adjourn.

Adjournment.

Report of Section of Apiary Inspection

The conflict of the meeting of this section with a session of the main association resulted in a very small number of inspectors being present. About ten states were represented.

Following the address of President Newell on "The Essentials of a Good Apiary Inspection Law" a general discussion of work as conducted in the different states was given. Most of the inspectors spoke of the necessity of educational work in connection with regular inspection duties. Work of this nature is carried on through articles in the county press, illustrated lectures before bee-keepers associations and farmer institutes and by field talks and demonstrations by inspectors. In most states the appropriations are meager and the majority of the work is being confined to sections where bee-keeping interests are largest.

The great demand for bee-keeping literature was evidenced by the remarkable requests for the bulletins recently issued in New York and Tennessee. These bulletins have been sent all over the world.

General disapprobation of the plan of the meetings which resulted in conflicts was expressed. Doctors Headlee and Britton were appointed as a committee to request the general secretary to arrange for the next meeting of the Section of Apiary Inspection without conflicting with other meetings.

N. E. Shaw of Ohio, was elected Section Secretary.

ADDRESS OF THE CHAIRMAN OF THE SECTION OF APIARY INSPECTION

THE ESSENTIALS OF A GOOD APIARY INSPECTION LAW

By WILMON NEWELL, *College Station, Texas*

An efficient law is the first requisite in the eradication of any contagious disease, whether of human beings, farm animals or insects. Perhaps the choice of the term "eradication" is not entirely a proper one. Entomologists have for some time recognized the fact that the eradication of an insect, in the sense of destroying all individuals of the species, is an end rarely if ever accomplished by artificial means. At the same time it must be conceded that contagious diseases of animals have been eradicated, in the fullest sense of the word, particularly within certain defined areas. In like manner we have seen the eradication of American foul brood from individual apiaries and occasionally from areas of considerable size; hence it appears that so far as contagious

diseases of bees are concerned, true eradication is not necessarily an impossibility and it is the one thing for which both the beekeepers and inspectors are striving.

The writer would not presume to discuss so weighty a subject as the essentials of a good inspection law, were it not for the fact that he has been directly concerned with the operation of various state laws relative to both nursery and apiary inspection. At this point it may not be amiss to call attention to the fact that many of the principles governing efficient nursery inspection are equally applicable to apiary inspection.

The Texas Legislature has recently passed an apiary inspection law which we believe to be one of the most efficient laws of the kind thus far enacted. This act was not formulated in a hurry, as is often unfortunately the case, but was in course of preparation for four years, during which time it was made to embody not only the features shown by actual inspection work to be necessary, but also the ideas of the best men in the Texas Beekeepers' Association. Several prominent attorneys, themselves beekeepers on an extensive scale, also assisted in drafting the bill. The result was a law which seems to cover the ground thoroughly and to provide for all contingencies which may reasonably be expected to occur. Perhaps one might say then, that the first essential of an apiary inspection act, or bill, should be its careful preparation before it is presented to the law-making body for the latter's endorsement.

As a second essential, we would say that the enforcement of the law should be lodged in the hands of some body as far removed as possible from the influence of politics. In the case of the Texas law active enforcement is in the hands of the state entomologist and this official is directly responsible to the director and governing board of the Agricultural Experiment Station. Local or county inspectors are appointed by the state entomologist, subject to approval of the board. Thus the appointment of the inspectors cannot be influenced in any way by local influences outside the beekeeping industry. While the law does not require such a step, our custom has been to appoint as county inspectors the men endorsed for those positions by the County Beekeepers' Associations, and we have found the plan to work well indeed. Objection is found to placing the execution of such laws in the hands of state Boards of Agriculture or Horticulture for the reason that such boards are usually appointed and their personnel often changes with each new turn of the political wheel. Even where the entomologist chief inspector operates under the supervision of such a board or commission, he is bound to be influenced to a certain degree by the probable political effect of his operations.

We cannot endorse too strongly the placing of bee disease eradication work in the hands of entomologists rather than beekeepers. While it is true that an intimate knowledge of beekeeping is the first and most important qualification of an efficient inspector, yet beekeeping after all is applied entomology in every sense of the word, and dealing with the diseases of bees is as much entomological work as is the utilization of entomogenous fungi or bacterial diseases in the warfare against injurious insects. The objection to a practical beekeeper having charge of disease eradication lies in the fact that such a man usually lacks the scientific knowledge and training necessary to thorough work.

While the chief inspector, or board having enforcement of the law in charge, must be allowed a certain latitude in the making of regulations, all essentials should be included in the law itself as far as possible. Legislative powers cannot be delegated to boards or officials and, while such authorities may adopt regulations for carrying out the expressed provisions of the law, they can go no further than this without exceeding constitutional limits.

The several states may not pass laws which interfere with interstate commerce and hence state officials cannot prohibit the shipment of nursery stock, or bees, or other commodity into a state. At the same time, it is certain that their jurisdiction over such shipments commences as soon as the latter have crossed the interstate line and the shipments may be stopped, inspected or condemned according to their condition and the state law governing them. The practical effect of this is to prevent shipments into a state except in those cases where the shipments will meet all requirements for intrastate shipment after their arrival. The state law, to be efficient, should provide for adequate inspection and quarantining of shipments immediately upon their arrival within the state and in like manner should provide suitable provisions for preventing the shipping of diseased bees from one point to another within the state. In this connection, the inspector should have full authority to enter depots, warehouses and cars for the purpose of inspecting bees therein which are in transit or which have been accepted for transportation. Provision in the law for preventing the sale or shipment of combs, hives and other fixtures likely to be infected is almost as important as preventing the sale of diseased bees.

One of the difficulties met with in eradication work is the dissemination of the disease through sale or shipment of honey taken from infected colonies. There is little question but what there is widespread dissemination of foul brood by this means and our failure to guard against this constitutes perhaps the weakest point in our present plan of foul brood eradication. At the same time, it does not appear practical to legislate against the sale of such honey and were the states

to legislate against it, there would be innumerable difficulties in the way of enforcing such a provision. However, this does not prevent enactment of a section which will impose a heavy penalty for malicious distribution of diseased honey for the purpose of intentionally spreading disease or introducing it into a new locality.

Among the most important essentials of a good law is the provision which permits of placing quarantines upon specific areas, such as counties or townships. Such quarantines may be either protective or restrictive. By protective is meant a quarantine which protects the quarantined area against the importation of diseased bees or fixtures. A restrictive quarantine, on the other hand, is applied to an infected area and prevents the movement of diseased material out of it. A protective quarantine protects a certain area against disease; a restrictive quarantine protects the state at large against a diseased area. Both kinds of quarantine are absolutely essential to successful eradication.

Another important feature of efficient laws is that which provides for the sheriffs and county attorneys assisting the entomologist or chief inspector whenever called upon to do so. It is also at times a marked advantage for the entomologist to have power to summon witnesses and take testimony under oath. This authority can of course be granted only by legislative act.

The postal regulations at present in effect regarding the sending of queen bees by mail appear to prevent much of the danger of disease being disseminated through this channel and any attempt by the states to regulate the sale or shipment of queens would appear to be unnecessary. At most the state law could include, as one of its sections, the essential requirements of the Post Office Department. Thus there would be no conflict between the two authorities, yet state officials could prosecute violations if it were found desirable to do so. Punishment by the federal authorities would probably be limited to barring the offending queen breeder from use of the mails for shipping his queens.

As it is considered necessary that bees be kept only in frame hives, for the eradication work to be efficient, the problem of compelling owners to transfer their bees from box hives to frame hives is constantly arising. One mistake often made is that of incorporating in the law a section providing for the confiscation of bees which the owner refuses to transfer, or the confiscation of diseased bees. Such a provision is contrary to the constitution of most of the states and if the inspector tried to carry it out literally he would get into no end of difficulties. I am frank to confess that the Texas law I have mentioned contains just such an unconstitutional provision, but in justice it should be said

that its presence in the act was due to the bunglesome error of a clerk, rather than to ignorance on the part of those who drafted the bill or the legislative committees which recommended its passage. Despite the fact that even diseased bees cannot be confiscated without due recompense being made to the owner, the inspector can, under an efficient law, prescribe and enforce such drastic treatment that the owner will destroy the diseased colonies himself rather than stand the expense incident to the treatment. The writer is not in favor of the unnecessary destruction of property; on the contrary, is fully in favor of saving diseased colonies wherever it is possible, but practical experience has shown that drastic action is sometimes necessary. In the case of bees in box hives, also, the inspector can make the transfer himself at the owner's expense if the law so provides. In such cases the cost of having the inspector do the work is much greater than if the owner does it and this is usually sufficient to insure the transfer being promptly made.

There are many other points to which consideration can and should be given in the formulation of an apiary inspection law, but perhaps the ones we have mentioned may possess a suggestive value to those directly interested in securing better legislation in this field.

BEE-KEEPING AND APIARY INSPECTION IN MISSOURI

By LEONARD HASEMAN, *Department of Entomology, University of Missouri*

The annual products of the Missouri bee are estimated to be worth nearly one million dollars, and are the output of about forty thousand apiaries or more than two hundred thousand colonies. This represents a considerable industry, and it is surprising how little actual enthusiasm is found among the bee-keepers of the state and how little state aid is given them in their attempt to improve conditions. In Missouri any attempt to secure state aid must be backed by sufficient evidence that the aid is needed and will produce results if it is given. As yet the bee-keepers have been unable, seemingly, to impress the legislature with their needs. This is not surprising when one considers that the State Bee-Keepers Association, the only association of its nature in the state, has at present a membership of less than one hundred, when there are nearly forty thousand bee-keepers to draw from. This shows a lack of support on the part of bee-keepers themselves, and without that first little state support can be expected.

In 1903 a few of the more progressive Missouri bee-keepers got together and formed the present Missouri Bee-Keepers Association. These few members gradually increased the enrollment of the association to something like one hundred members. It is not a strong

association, though it includes a number of enthusiastic members. At their various annual meetings interesting papers on bee-keeping have been given, and they have helped in many ways to improve conditions of bee-keeping in this state. One of the most important results of their work was the passage of the present Apiary Inspection Law. A number of attempts were made before they finally succeeded in securing the support of the legislature in passing the law. The law is very brief in form, but gives the necessary authority for inspection and cleaning up diseased apiaries. Unfortunately the funds for this work have never been anything like adequate for the ground that needed covering, and consequently the work of the Inspector has been much restricted. From his annual reports it seems a considerable area is covered each year, and a great many diseased colonies are discovered and treated. Considering the area of the state of Missouri and the extent of the bee interests at least five thousand dollars ought to be available for this work, but in no case in the past has there been more than twelve or fifteen hundred dollars available for meeting the expenses of inspection and the salary of the Inspector.

The University and Agricultural Experiment Station have just recently undertaken some special work in bee-keeping. Realizing the necessity of information and assistance along the line of practical bee-keeping, courses are being offered, and investigations are planned for studying the best methods of handling bees in Missouri, and special investigations of more scientific problems which have not yet been fully worked out with bees will be undertaken. The writer has been attempting to expand the work of the entomological department so as to make it cover all lines of entomological work and thereby increase its usefulness. This is one of the more important recent lines taken up, and every effort will be made to improve bee-keeping in this state. There is a growing demand for information and assistance with bee-keeping in this state, and it is a duty of the Experiment Station to encourage and help out with this work.

The Apiary Inspection work is under the supervision of the State Board of Agriculture and it is to be hoped that that Board will give further assistance to the bee-keepers and help to further improve conditions. The Station will cooperate in every way possible with the Board to place Missouri bee-keeping on an equal footing with that industry in other states. The Experiment Station hopes soon

be able to prepare helpful reports on the care of the home apiary and for handling commercial apiaries in this state.

Proceedings of the Twelfth Annual Meeting of the American Association of Official Horticultural Inspectors

The Twelfth Annual Meeting of the American Association of Official Horticultural Inspectors was held in Atlanta, Ga., on January 1, 1914.

The first session was held in the Main Building of the Atlanta Medical College, and was called to order at 2 p. m. by the chairman, E. L. Worsham, with J. G. Sanders, Secretary.

The following inspectors and visitors were present, and especially welcome were the several gentlemen representing the American Association of Nurserymen who are so heartily interested in the movement to secure more uniform state horticultural legislation, and who met with us to discuss the uniform law submitted at the meeting:—

George G. Atwood, Albany, N. Y.; R. Kent Beattie, U. S. D. A., Washington, D. C.; G. M. Bentley, Knoxville, Tenn.; E. W. Berger, Gainesville, Fla.; W. E. Britton, New Haven, Conn.; J. E. Buck, Auburn, Ala.; S. C. Clapp, Raleigh, N. C.; R. A. Cooley, Bozeman, Mont.; A. F. Conradi, Clemson College, S. C.; J. H. Dayton, Painesville, O.; Geo. A. Dean, Manhattan, Kans.; Sam H. Dixon, Houston, Texas; H. T. Fernald, Amherst, Mass.; P. A. Glenn, Urbana, Ill.; R. W. Harned, Agricultural College, Miss.; Thomas J. Headlee, New Brunswick, N. J.; Dr. C. Gordon-Hewitt, Ottawa, Canada; W. E. Hinds, Auburn, Ala.; J. R. Horton, New Orleans, La.; S. J. Hunter, Lawrence, Kans.; W. D. Hunter, Washington, D. C.; C. L. Marlatt, Washington, D. C.; Thomas B. Meehan, Philadelphia, Pa.; Haven Metcalf, U. S. D. A., Washington, D. C.; A. W. Morrill, Phoenix, Ariz.; Aven Nelson, Laramie, Wyo.; W. C. O'Kane, Durham, N. H.; W. A. Orton, U. S. D. A., Washington, D. C.; P. J. Parrott, Geneva, N. Y.; L. M. Peairs, Morgantown, W. Va.; William Pitkin, Rochester, N. Y.; Abken A. Potter, Washington, D. C.; Charlotte W. Potter, Washington, D. C.; W. V. Reed, State Capitol, Atlanta, Ga.; W. E. Rumsey, Morgantown, W. Va.; J. G. Sanders, University of Wisconsin, Madison, Wis.; E. R. Sasser, Washington, D. C.; W. J. Schoene, Blacksburg, Va.; N. E. Shaw, Columbus, Ohio; Franklin Sherman, Jr., Raleigh, N. C.; A. J. Spangler, St. Anthony Park, Minn.; Percy Spaulding, U. S. D. A., Washington, D. C.; W. P. Stark, Stark City, Mo.; H. E. Summers, Ames, Iowa; J. Edward Taylor, Salt Lake City, Utah; E. S. Tucker, Baton Rouge, La.; Ira Williams, Atlanta, Ga.; E. Lee Worsham, Atlanta, Ga.; W. W. Yothers, Orlando, Fla.; Peter Youngers, Geneva, Neb.

The record of the business transacted at the evening session held in the Ansley Hotel is incorporated at this point in the report.

The report of the Committee on Standardization of Phraseology and Value of Inspection Certificates, composed of A. W. Morrill, chairman; Franklin Sherman, Jr., and F. L. Washburn, was presented by the chairman.

It was moved by Mr. Atwood and carried that the report be received and published and the committee be continued. This report will appear later in printed form.

REPORT OF SECRETARY-TREASURER

The affiliation of the American Association of Horticultural Inspectors with the American Association of Economic Entomologists, seems a most commendable departure from our former régime, and should add impetus and power to our efforts in whatever line of work we are engaged. The maintenance of a membership list with annual dues is no longer required since our affiliation.

A balance of \$39.27 was received from the former treasurer, and was placed to the credit of our Association in the First National Bank of Madison. Expenditures to date have totaled but \$5 for stenographic work, leaving a balance of \$34.27.

Respectfully submitted,

J. G. SANDERS, *Sec'y-Treas.*

It was moved by Professor Summers and carried by vote that the report of the Secretary-Treasurer be accepted.

By vote of the Association, Prof. J. G. Sanders, of the University of Wisconsin, Madison, was re-elected Secretary.

(NOTE.—Dr. W. E. Britton was nominated and elected by the Association of Economic Entomologists as chairman of the Section on Horticultural Inspection.)

REPORT OF COMMITTEE ON PUBLICATION, DESCRIBING DANGEROUS INSECTS AND PLANT DISEASES, LIABLE TO BE IMPORTED AND SPREAD ON NURSERY STOCK

At the present time this committee can only report progress. The undersigned were appointed members in March and immediately communicated with Mr. C. L. Marlatt, chairman of the Federal Horticultural Board, requesting that the Board carefully consider the resolution passed at the Cleveland meeting, that a publication be issued giving brief illustrated accounts of "(1) the various dangerous insect, fungous and other enemies of vegetation liable to be introduced on nursery stock or other plant products, (2) similar pests already present in portions of this country and which may be spread on plant products."

Mr. Marlatt replied that "it is expected that a publication of the scope indicated will soon be made available within a reasonable time," by the Bureau of Entomology and further stated that Doctor Howard had already obtained material of the important European pests with this end in view; that further collections would be made; and that in the preparation of the publication the points in our request would be kept in view.

Under date of November 21, a letter was sent to Mr. Marlatt inquiring about the progress of the work of this publication, in view of preparing this report. Mr. Marlatt replied in part as follows:

"I regret that the effort to secure a publication covering important insect pests and plant diseases of foreign countries has not been prosecuted to an advanced stage of completion. Doctor Spaulding, who has been appointed the Pathological Inspector of the Federal Horticultural Board, has, however, in preparation, and is now working on the plant disease half of the project. Doctor Howard has promised to take up the insect half and, through his chiefs of sections, have it perfected. This project will be pushed and, perhaps not this year, but certainly early next year, a publication will be available which will give a brief description and, where possible, illustration of the important foreign insect enemies, the entry of which into this country should be guarded against."

Simultaneously the following letter was received from Doctor Howard on this subject:

"Mr. Marlatt has handed me your letter of November 21, in regard to the matter of a publication giving the important insect pests and plant diseases.

In reply I hasten to inform you, of what you probably know already, that for two or three years past the firm of Deyrolle Fils, of Paris, the well-known dealers in natural history supplies, have, through specially trained men under the cooperative guidance of Dr. Paul Marchal of Paris, been getting together collections of European insect pests in their different stages, paying especial attention to the hibernating stage in which insects are most likely to be carried from one country to another. This collection is designed for purchase by this Bureau, and a large series has already been received here in Washington. These are being put in position for careful illustration, the illustrations eventually to be used in such a publication as that mentioned by you. In the meantime, Prof. A. L. Quaintance's address as retiring President of the Entomological Society of Washington (just issued) deals with this same subject and covers very well the principal injurious insects of the entire world which are liable to be unported. Moreover, a capital hand-book of the insect pests of Europe and a few extra-European countries has just been published as a part of Sorauer's *Handbuch für Pflanzenkrankheiten*. This has been prepared by Dr. L. Reh of the Hamburg Natural History Museum, and is very well done. It is planned in the Bureau to take Professor Quaintance's address as a basis and to have each of the experts in charge of branches of the work go carefully through the literature and make such additions as they find to the species mentioned by Professor Quaintance; and then it is proposed to publish an advance pamphlet with comparatively few illustrations, which may be superseded at a later date as material for advantageous illustration accumulates."

From the foregoing, it seems that the work on this publication is not only well organized, but is actually well under way, and that we may expect the publication to appear during the coming year. We therefore recommend that this committee be discharged.

W. E. BRITTON,
T. J. HEADLEE,
N. E. SHAW,
Chairman.

On motion, the report was accepted and the thanks of the Association extended to the members of the committee.

AFTERNOON SESSION

Chairman E. L. Worsham called the Association to order at 2 o'clock and extended the heartiest greetings of the people of Atlanta and of the state of Georgia to the members and visitors, but on account of the length of the program hesitated to address the Association at length.

The following program was presented in order:—

"A Few Problems in Connection with the Administration of the Minnesota Inspection Law," by F. L. Washburn and A. J. Spangier. St. Anthony Park, Minn.

"Notes on Entomological Inspection in the District of Columbia," by E. R. Sasser, Washington, D. C.

"The Gipsy Moth and Brown-Tail Moth Quarantine in New England," by D. M. Rogers, Boston, Mass. Paper presented by A. F. Burgess.

"The Control of the Boll Weevil by Quarantine," by W. D. Hunter, Washington, D. C.

"Problems of Plant Quarantine," by W. A. Orton, Washington, D. C.

"Inspection of Plant Diseases," by Perley Spaulding, Washington, D. C.

"The Workings of the Federal Plant Quarantine Act," by C. L. Marlatt, Washington, D. C.

"Uniform State Inspection Laws." Being in part a report of the Committee on Uniform Legislation, by J. G. Sanders, The University of Wisconsin, Madison.

"Nursery and Orchard Inspection Work in Missouri," by Leonard Haseman, Columbia, Mo. (Read by title.)

The following address on "Uniform State Inspection Laws" is in part a report of the Committee on Uniform Legislation appointed at the previous annual meeting at Cleveland, Ohio, and was preliminary to the presentation of a model state horticultural inspection law which will appear later as accepted, in printed form in the *JOURNAL OF ECONOMIC ENTOMOLOGY* and in some nursery trade publication.

The model law was submitted on December 31, 1913, to a committee of nurserymen gathered in the Piedmont Hotel, Atlanta, Ga., at the invitation of Prof. J. G. Sanders. The following were present during the consideration of the model law:—Messrs. William Pitkin, Rochester, N. Y.; J. H. Dayton, Painesville, O.; Thomas B. Meehan, Philadelphia, Pa.; Peter Youngers, Geneva, Neb.; W. P. Stark, Stark City, Mo.; L. A. Berckmans, Augusta, Ga.; S. J. Hunter, Lawrence, Kans.; C. L. Marlatt, Washington, D. C.; J. G. Sanders, Madison, Wis.

After a consideration of the bill lasting several hours, it was accepted as quite satisfactory with several proposed minor alterations. With these alterations included, the bill was presented to the inspectors at the regular session, and elicited numerous questions, which could not be fully discussed on account of lack of time. It was suggested that members communicate their objections or proposals of changes to the secretary, J. G. Sanders, at an early date.

The report was accepted and the committee continued.

UNIFORM STATE INSPECTION LAWS

By J. C. SANDERS, *The University of Wisconsin, Madison*

The desirability of greater uniformity in the provisions of state laws regulating the inspection and transportation of nursery stock is apparent to everyone who is in any way connected with this important line of work. Much criticism has been engendered by the widely varying horticultural laws and regulations of the several states and districts of the United States on account of the tremendous inconvenience, delay and pecuniary losses.

The national, district and state associations of nurserymen have asserted themselves forcibly in favor of state inspection laws which shall be uniform in every respect possible under the varying conditions and features of the nursery business in the various sections of the United States. This sentiment on the part of the nurserymen is being backed by a considerable fund which is to be used in the furtherance of greater uniformity, and as I understand, their intention is to assist by every honorable means the passage of new laws in some states, and the amendment of laws in others, seeking to introduce in every legislature, wherever possible, such a bill as will be adopted by the nurserymen and inspectors in convention.

This most important problem has been presented in a forcible way to the nurserymen through several channels of publicity, and it is safe to say that practically every nurseryman of importance is familiar with the movement under way.

This Association at its last annual meeting appointed a Committee on Uniform Legislation with Mr. C. L. Marlatt as chairman, Mr. Franklin Sherman, Jr., and the writer as members of that committee to review the various state laws on inspection and to draw up a model bill which should incorporate every feature of the various state laws as far as is possible without distinct conflict. Mr. Marlatt pleaded that he was so completely engrossed by his work as chairman of the Federal Horticultural Board that he preferred to be excused and delegated the entire proposition to the writer. Mr. Sherman pleaded a lack of knowledge of the state regulations, and so many other duties that he would be unable to assist on the committee. Therefore, you will see the two gentlemen who were named as first and second parties on the committee have felt it their privilege on account of rank to delegate this problem to the third member of the committee.

The writer has reviewed the various state horticultural inspection laws and rules and regulations with much interest to find a wonderful conglomeration of ideas, a remarkable mixture of various types of inspection incorporated in one law, and in many laws great verbosity.

The reviewing and digesting of these regulations have been a much greater task than the writer had contemplated. Several of our state laws have combined in the same paragraphs measures for the control and prosecution of several lines of inspection, viz., nursery, orchard, fruit, fruit-package and insecticide inspections, the whole making a mass of regulations from which it is almost impossible to extricate the nursery inspection features.

My first recommendation would be that the nursery inspection be entirely divorced from other phases of inspection, at least that the nursery inspection regulations appear in separate paragraphs from other horticultural legislation.

The second recommendation is that coöperation of national, district and state associations of nurserymen is highly desirable to influence the higher state officials and legislators for a better quality and larger quantity of inspectors who shall be paid salaries sufficient to retain them in the work year after year, so that they could become familiar with every phase of inspection work in their district.

Third.—A similar coöperation is desirable to secure sufficient state appropriation to carry out every phase of the horticultural inspection without handicap, and to remove the necessity as disclosed in some states of demanding a license fee of local and outside state nurserymen, which in many cases is the sole support of the inspection work. Horticultural inspection work of every kind is of state-wide benefit and hence should be supported by state funds rather than by individual assessment.

Fourth.—Some general method of supervision of the inspection work in the various states by the Federal Board with particular reference to a more uniform quality of inspection and to a more uniform certificate seems highly desirable, particularly with reference to nurseries that pack a considerable portion of their stock for interstate shipment. All of us are aware that the quality of inspection varies tremendously in the different states and on that account there has been a feeling of doubt manifested among the states as to the value and intent of an official certificate license.

Practically all of the states west of, and including Montana and Colorado, refuse to accept eastern certificate licenses, and make it a practice to reinspect at point of delivery all incoming plant material. Such reinspection is undoubtedly a wise method under the existing quality of inspection in many states. The nurserymen and inspectors and public in general of the East, where many pests and diseases are prevalent, do not realize the extreme importance and desirability of excluding these pests from the clean Western States by using every available method of inspection and quarantine.

It seems that the time has arrived that nurserymen and inspectors

are being impelled by a more thorough knowledge of the terrible possibilities which would be a resultant of an open door policy or even moderate laxity in horticultural inspection. These two factions, we might call them, are arriving at more friendly terms brought about by a thorough knowledge of the most praiseworthy demands of the other. Each is beginning to realize that their relationship with reference to inspection is to be a continuous performance and with the advent of greater interest and more complete knowledge of nursery pests, the nurserymen are beginning to realize certain problems which the inspectors have been trying to drive home, that no inspection can be too careful, too painstaking or too thorough to accomplish the optimum results.

The inspector is in a peculiar position with respect to the inspection work, a position which is difficult to define; one in which there is no personal gain either immediately or ultimately. It seems that he is acting with a truly scientific and humanitarian spirit in many cases where he is oftentimes working either without salary, or a salary incommensurate with the quality of service performed.

In drawing up the submitted model law, only the most general and necessary regulations have been included which are important features in the work of every state, such as the method of appointment of the inspector and deputies, his duties and powers, definitions of terms used in the law, the treatment of diseased stock on premises, the granting of nursery certificate licenses, misrepresentation of stock, treatment of imported stock, shipping tags, and penalties for violations. An attempt has been made to exclude, as far as possible, all legal verbiage and unnecessary reiteration of terms and phrases, and to use plain English in a manner as concise and definite as seems advisable.

No great claims are made that this submitted law is without fault or possibility of great improvement, but a real attempt has been made to include all of the options which seem desirable in conforming with various state practices and yet arrive at a law which seems to be applicable and available to every state condition in so far as it goes.

The power of making special rules and regulations to satisfy local conditions has been granted the inspector under the jurisdiction of higher authority. An appeal from the orders of the state inspectors appears in section 9, and in sections 23 and 24 mere mention is made of compensations of inspectors and appropriations, fees or other supports of the inspection service; all of which seem to be local matters, yet affecting outside parties to a remarkable degree, especially the matter of license fees, which I trust ultimately will be eliminated from all state laws. I believe that such elimination of fees will be hastened by the cooperation of inspectors and associations of nurserymen with their

mitted influence and pressure brought to bear upon the proper authorities.

After thorough consideration of the various state laws governing horticultural inspection, several ideas have been conceived which are outlined in the following recommendations to the Federal Horticultural Board and are respectfully submitted for consideration.

RECOMMENDATIONS TO THE FEDERAL HORTICULTURAL BOARD

1. A national law prohibiting the acceptance by common carrier or any person of any nursery stock for interstate shipment, unless accompanied by a valid state certificate-license tag, certifying official inspection of the contents.

Such a law, in conjunction with the proposed state law, would act as an effective check on unlicensed shipments everywhere in the United States.

2. Several state laws demand that outside state nurserymen file a bond of \$500 to \$1,000 before selling privileges are granted. Private correspondence with various inspectors, principally Western officials, elicits the opinion that such a demand is justifiable. It may not be unreasonable.

But a more reasonable method of handling this proposition, with less expense, less trouble and annoyance to all concerned, is recommended as follows:—That each nursery desiring to sell, in those states demanding a bond, file a bond of \$1,000 with the Federal Horticultural Board which shall make public this fact to the officials of all interested states, and that this bond shall be available for legal action, on demand, or appeal to the Federal Horticultural Board, by any states suffering from violations of its horticultural laws.

3. To eliminate the wholly unnecessary practice of filing a duplicate copy of a state license with the officer of another state to issue a license before carrying on business in that state,—it is recommended (and is provided in the submitted model law, section 6) that each state maintain a complete list of inspected and certificated nurseries and dealers with the Federal Horticultural Board, which list shall be available to the official inspectors of any state.

4. An absolute quarantine may be established by the Federal Horticultural Board, covering any district, state, or group of states, and for any insect, disease, or plant, prohibiting not only shipment *from* an infested or infected area, but also shipment *into* an area known to be clean. The recent California quarantine against shipments of peaches, almonds, nectarines, etc., is typical of action which might be taken for the ultimate good of all concerned. It is further recommended that at the solicitation of state officials thorough investigations be made and appropriate action taken.

5. Certain states demand that all nursery stock from other states shall have been fumigated before acceptance under their laws, and it happens that at least one of those states does not demand fumigation of its own stock for interstate shipment, although San José scale is not a stranger. Manifestly the scale conditions in some of our Eastern States is such that fumigation should be required of all stock for interstate shipment. On the other hand, in Iowa, Nebraska, North and South Dakota, Minnesota, and Wisconsin, where there is little or no San José scale, it would be an unnecessary requirement, and these uninfested states have a right to demand greater protection than they have had in the past.

It therefore seems wise that the Federal Horticultural Board should determine the conditions in our states and use their judgment in establishing a quarantine area from which no nursery stock shall enter interstate commerce, without proper and thorough fumigation with hydrocyanic gas.

The above recommendations are to be considered as personal opinions of the writer, resulting from a considerable acquaintance with nursery pests, nursery conditions and practices, and methods of nursery inspection in several sections of the country.

INSPECTION FOR PLANT DISEASES

By DR. PERLEY SPAULDING

In your inspection of nursery stock you have already become familiar with the various indications of the work of parasitic insects. It, therefore, will be relatively easy for you to separate the symptoms of diseases caused by adverse physiological conditions and fungous parasites from those troubles brought about by the insects. It may be well to briefly consider the various symptoms of plant diseases. The most common symptoms are the following:

Pallor, either in part or of the entire plant, this usually occurring in herbaceous plants and occasionally in the leaves of shrubs. This is caused by certain adverse conditions of the soil.

Spots on the foliage or occasionally upon the younger twigs of shrubs and upon the main stems of herbaceous plants. These spots may be white, gray, yellow, red, brown, black, or variegated. These are caused by a great number and variety of fungous parasites.

Shot hole of leaves. This usually occurs upon the stone fruits and is caused by the attacks of a fungous parasite killing small circular areas of leaf tissue which fall out and leave round holes.

*Wilt*ing, either of entire plants or of parts. This may be caused by

drought, but there are some very serious fungous diseases which have this symptom.

Death of parts of the affected plant, such as the fire blight of pear and apple twigs.

Dwarfing or atrophy of the affected parts of diseased plants.

Hypertrophy or swelling of the affected parts.

Formation of entire new structures, example ergot.

Mummification. This occurs with a considerable number of the fruit rots.

Change of position of affected part. Example, witches brooms produced by certain fungous parasites.

Destruction of the affected organs, example, grain smuts.

Exerescences and malformations, such as galls, cankers, witches brooms, rosette, and punks or fruiting bodies of the large wood-rotting fungi.

Exudations, consisting of pitch, gum, or slime-flux.

Rotting of fruits, leaves, or of stems in woody-stemmed plants.

In the inspection of nursery stock for diseases, we may classify diseases according to the part of the plant upon which they occur into (1) Diseases of foliage, (2) of twigs, branches and stems, and (3) of the roots.

In general, the diseases of foliage are not serious, except upon seedlings or young nursery stock. These diseases are important, however, with the herbaceous plants. The diseases of the twigs, branches and stems are often very serious with the woody-stemmed plants. Examples of such diseases are:

Killing of twigs on roses, etc., by *Botrytis*.

Killing of stems of conifers and deciduous trees by *Nectria ditissima* and *N. cinnabarina*.

The chestnut bark disease, which is the most destructive disease of large trees known at the present time.

The various apple cankers

The rose and raspberry stem cankers.

Killing of twigs of stone fruit trees by the gray rot (*Monilia*).

The various pine-stem blister rusts.

The well-known black knot of cherries.

Our last group, the diseases of roots, are especially serious, not only because they destroy the feeding organs of the plant, but because they cause more or less serious soil infection, oftentimes lasting for several years or longer. Examples of this class of diseases are the well-known crown gall and hairy root of fruit trees, various kinds of root rots, and, finally, but by no means least, root diseases caused by nematodes or eel worms. The latter are especially serious, because soil once infected

cannot be used for a considerable number of years afterwards for crops of a similar nature. A very serious feature also of nematode soil infection is the fact that some species of nematodes have an immense number of food plants. It should also be mentioned that a very serious disease of citrus trees has recently been discovered to be caused by one of the nematodes. Some root diseases to which attention is now very sharply drawn are the various diseases of the potato tuber, which were so prominent in the recent hearing held in Washington to consider the advisability of total exclusion of foreign-raised tubers.

Finally, I may say a word regarding the diseases which are known to occur in imported nursery stock.

It has only recently been discovered that the chestnut bark disease is a native of China, and was undoubtedly imported into this country.

The white pine blister rust is known to have been imported directly from Europe.

The potato wart and potato powdery scab occur upon imported potatoes.

Crown gall and hairy root have been found upon a considerable number of different fruit trees and also upon several of the ornamental shrubs.

Azaleas have been found quite generally affected with leaf galls caused by an *Exobasidium*.

Rhododendrons in one case were found infected with a tiny leaf gall caused by a *Synechtrium*.

Miscellaneous leaf spots have been found upon a number of different species of shrubs.

Clematis has been found affected with root rot.

Paeonia, lilac, and rose leaves and stems have been found with the small black sclerotia of the fungus *Botrytis vulgaris*, which develop in transit.

Finally may be mentioned the finding of the fruit rot fungus *Glomerella rufomaculans*, fruiting on avocado seeds; apparently an entirely new observation for this fungus.

In order that I may be familiar with what you are finding in different parts of the country, I have asked you to forward to me specimens of diseased plants which you may encounter in your inspections. Free and cordial coöperation in this regard will do much to make efficient my own efforts to help you solve some of the knotty problems in connection with inspection for fungous plant diseases.

An exhibit was made of diseased plants illustrating various symptoms of disease.

PLANT QUARANTINE PROBLEMS

W. A. ORTON

MR. CHAIRMAN AND GENTLEMEN: As Mr. Marlatt is to speak to you of the work of the Federal Horticultural Board for the past year, I will not touch on that topic, but will discuss some problems that we have in common for the future, in our great task of preventing the spread of insects and plant diseases, and present some considerations that may govern our viewpoint and policies toward quarantines and inspections.

We have had to deal in the United States with a succession of pests, mostly invaders from foreign lands, and we still find our hands very full with the inspection and police duties necessary for the control of these unwelcome visitors. There is expended in this country a vast sum for this type of work and, as the extermination of the parasites now seems hopeless, we are faced with the necessity of continuing these expenditures until the end of time.

Regret is often expressed that a small fraction of this great sum could not have been available to prevent the introduction of these pests or to exterminate them before they had gained a foothold here. Unquestionably money expended on scientific investigations of means of preventing the introduction and spread of insects and diseases yields much greater proportionate returns than that spent on inspection and control, and had the biologists of a generation ago known what we now know, and had they received a tithe of the support now given by the state, many, perhaps most of these destructive insects and diseases would have been excluded or controlled.

The point I would emphasize today is that we are still far from the end of our journey. By no means all of the dangerous insects and diseases of the world are already with us. There exist in Europe and especially in the Orient, many, many other parasites which would doubtless prove very destructive under our conditions, and danger of introducing them is ever present. Witness the spread of the chestnut bark disease, and the fruit flies we are attempting to turn back from our Pacific and Mexican borders.

To guard against these perils of the future is now our important problem, a problem that has not yet been adequately solved, but which we are infinitely better prepared to cope with than were our predecessors of the last generation, for we have now the legal authority that was formerly lacking, and we have this great organization of state inspectors, backed by the entomologists and plant pathologists of the Experiment Stations and colleges, and supported with relative liberality by a people growing more and more awake to the importance of the work.

We should have ever in mind that quarantines must be based on biological principles established through scientific research, that inspection and regulation are makeshift, although necessary, measures forced upon us by the failure to prevent the original invasion of these pests, and that it is our paramount duty to contribute out of our abundant opportunity to fundamental investigations of means of preventing the introduction and spread of insects and plant diseases. It is my conviction that we are not making the fullest use of existing opportunities. Every state has inspectors whose official travel takes them to every section of their territory, so that as a body they cover the whole of the United States. Can we not enlist the aid of these men in other respects *than the examination of nurseries for scheduled parasites?* and especially can we not organize a systematic and country-wide survey of the injurious insects and plant diseases of the United States? *The beginnings of such a survey have already been made in the Bureaus of Entomology and Plant Industry, but the data available are distressingly incomplete.* The purpose of such a survey would be (1) to record the geographic distribution of insects and diseases and their annual prevalence in each section of the country, (2) to estimate the losses suffered each year in order that the economic importance of the subject may be understood, (3) to discover at the earliest moment the introduction into the country of new and possibly dangerous parasites, (4) to study epidemics or unusual outbreaks in relation to weather, crop distribution and other factors, and to obtain a better knowledge of the conditions governing the development, spread, and control of such outbreaks, (5) to gather data respecting the resistance and susceptibility of varieties to disease, for comparison of reports from different sections and correlation with climatological records.

I shall lay special stress on the plant disease survey because the state inspectors are perhaps already duly watchful for insects, but we need your help and that of all your assistants in collecting more data on plant diseases. The Plant Disease Survey, as at present organized, centers in the Bureau of Plant Industry, with the aid of collaborating plant pathologists in each state. The opportunities for travel enjoyed by the nursery inspectors are, as a rule, so much greater that they could be of exceptional assistance in reporting on field conditions if their interest can be enlisted.

I mentioned a moment ago the need of basing our quarantines and other procedures for disease and insect control on scientific investigations. We are embarrassed at every turn by the lack of knowledge on points of vital importance, such as the geographical distribution of a fungus or an insect, its host plants or its full life history. A multitude of details relative to the means of spread of parasite re-

mains to be worked out. The very existence of the parasites of greatest peril has often been discovered after it was too late to prevent their importation, as in the case of the chestnut bark disease. Not only domestic surveys of insect and fungous parasites are necessary, but foreign surveys as well, and there is particular need of information from the lesser known continents of South America and Asia.

That the parasites of other continents are most dangerous is abundantly proved by the experience of Europe with the Phylloxera, the black rot, and the mildew of the vine, and more recently with the gooseberry mildew, and by our experience with the imported gypsy moth, the brown-tail moth, the codling moth, the asparagus rust, the hollyhock rust, and the late blight of potato. Nature tends to preserve an equilibrium between native plants and their parasites, but when this is disturbed by man, through the chance transfer of a parasite, the invader, if a fungus, finds relatives of its original host, which lack resistance to its attacks, or, if an insect, it leaves its own natural parasites behind and spreads in the new field to an extent never known in its native habitat.

These facts greatly complicate our task, for it is hard to foresee where the dangers lie. To secure concerted and coöperative action in all countries would greatly facilitate the work, and it is an encouragement to know that the need for such international efforts is being more strongly felt in Europe, and that a movement which has been gaining headway for many years promises to result finally in definite action in connection with the International Institute of Agriculture at Rome.

THE MOVEMENT FOR INTERNATIONAL PHYTOPATHOLOGY

The term phytopathology in Europe is used to include insects as well as fungous and other troubles, since the field of work of the entomologists there has not been as clearly separated from pathology as in the United States. The history¹ of this international movement dates back at least to 1880, when Dr. Jacob Eriksson, the eminent Swedish botanist, laid a plan for international action before the international congress for agriculture and forestry at Vienna. In 1891, at the International Congress at The Hague, Professor Rostrup called attention to the need of means for preventing the introduction of epidemic diseases through the importation of living plants or seeds infected by parasites. In 1900, Eriksson presented the matter to the Fourth International Congress for Agriculture at Paris, and again in 1903

¹ Louis Dop. Rapport sur la coopération internationale dans la lutte contre les maladies des plantes, présenté au congrès international de pathologie comparée. Paris, 1912.

to the Seventh International Congress for Agriculture at Rome, where a special committee on phytopathology was formed, composed of representatives from the several countries and headed by Dr. Paul Sorauer,¹ whose *Zeitschrift für Pflanzenkrankheiten* was made the official organ.

In 1905 the International Institute of Agriculture at Rome was founded through the initiative of the King of Italy. This Institute named as one of its objects the better control of plant diseases, and the subject was discussed more or less at each of its subsequent sessions. In 1907 the Swedish Government presented to the Institute a detailed plan for the creation of international stations for phytopathology, and this was followed by the establishment of a special section for plant diseases.

Dr. Eriksson² brought the subject before the Eighth International Congress for Agriculture at Vienna (1907) and in 1908 before the International Botanical Association at Montpellier, where favorable resolutions were adopted. He has also published several independent articles pleading for international action for the control of plant diseases, and in 1905 endeavored to bring about general action in Europe to check the spread of the then recently introduced American gooseberry mildew. The International Association of Academies, meeting in Rome in 1910 discussed the suggestion of Doctors Eriksson and Sorauer and approved the centralization of the work in the International Institute at Rome. This Institute began the collections of data and in 1911 published a monograph on the organization of the service for the control of plant diseases in the countries adhering to the Institute.³

In October, 1912, at the International Congress for Comparative Pathology at Paris, the whole subject was fully discussed, and the French Government was invited to take the initiative by calling an International Phytopathological Commission to meet in Rome in April, 1913. This action was taken by the French Government and the date set for April 25, 1913, at Rome, preceding the meeting of the International Institute. Owing to the short notice, however, several governments could not accept and the meeting was postponed. At the

¹Sorauer, Dr. Paul. *Internationaler Phytopathologischer Dienst*. *Zeitschrift für Pflanzenkrankheiten*. Berlin-Schöneberg (1908).

²Eriksson, Dr. Jakob. *Une lutte internationale contre les maladies des plantes cultivées*. Stockholm. 1909. *Landbruksbotanisk Verksamhet vid Kongl. Landbruks-Akademiens Experimentalfält under Åren 1878-1912*. Stockholm. 1913.

³*L'organisation actuelle du service de protection contre les maladies des plantes et les insectes nuisibles dans les divers pays*. *Institute International D'Agriculture*, Rome, 1911.

meeting of the Institute, May 6-12, 1913, the question was brought up and discussed by a number of the delegates who were plant pathologists. The necessity of such a conference was emphasized and the French Government was asked to repeat its invitation. This has been done and there will be a meeting of the International Commission on Phytopathology on February 24, 1914, in Rome, where it is hoped that the United States may be represented.

The desirability of international coöperation has already been realized in this country. The American Phytopathological Society at its meeting in Cleveland, December 31, 1912, to January 3, 1913, held a symposium on international phytopathology and adopted the following resolutions:

Resolved, That the American Phytopathological Society, appreciating the fact that plant diseases do not heed national limits or geographical boundaries and also the evident limitations imposed upon investigations when restricted by national bounds, respectfully recommend that administrators of research institutions, whether state or national, as well as individual investigators, recognize the importance of establishing closer international relations and take such steps as may be practicable from time to time to this end, including not only more frequent visits of American investigators to foreign countries for field observations as well as research, but also the securing, either by permanent or temporary engagement, of the best of foreign experts in plant pathology.

Though the desirability of international action relative to plant diseases and insect pests is generally admitted, the measures proposed vary exceedingly.

Professor Eriksson has from the beginning argued for one or several special stations for phytopathological investigation, to be supported by the Institute and under its control. He proposes that one of these be devoted to cereal diseases, another to potatoes and sugar beets, and a third to fruits. The stations are to be located where the diseases which are the object of the investigations play an important rôle, and are to continue for at least ten years.

Professor Cuboni has backed the idea of a more efficient inspection of nursery stock, as is indicated by the recommendations which he prepared for adoption by the General Assembly:

The general assembly recommends that the governments adhering to the Institute:

- 1) Organize, if they have not already done so, a government service of phytopathological inspection and control, especially for nurseries and establishments dealing in living plants intended for reproduction.
- 2) Enact that all consignments of plants intended for reproduction be accompanied by a certificate similar to that required by the Berne phylloxera convention

International Institute of Agriculture at Rome. Senate Document No. 196, 63rd Congress, 1st Session, p. 31.

to be delivered by the government inspector, certifying that said plant comes from a nursery subject to his control and free from dangerous cryptogamic or entomological disease.

(3) In case one or more states disagree as to whether a given disease should be described as dangerous, or when there is grave reason to suspect the presence of new and dangerous disease liable to be spread by plants not intended for reproduction, the governments concerned should convene a commission of specialists of their respective countries to study and propose the most practical mode of preventing the spread of the disease with the smallest possible loss to the trade of the countries concerned.

(4) The assembly considers that an international agreement is indispensable for the protection of agriculture against plant diseases. Such an agreement should be based on the principles outlined in paragraphs 1 to 3 of these resolutions and should set forth: (a) The measures and methods of inspection and control; (b) a list of diseases recognized as dangerous; (c) what products should be subject to control; (d) the blanks and form of certificate; (e) the mode of arbitration to be resorted to in disputed cases.

(5) The assembly considers that the convening of an international commission of specialists, as proposed by the French Government, would greatly facilitate by its preparatory labors the conclusion of an agreement by plenipotentiaries.

The assembly expresses the wish that said commission convene as soon as possible, and that this may be followed at once by the conclusion of an agreement.

(6) The assembly is of the opinion that whenever the General Assembly of the International Institute of Agriculture convenes, government specialists on plant pathology should meet in a special commission to (a) come to an understanding on common studies bearing on plant diseases; (b) to keep in touch with the results obtained by the enforcement of the international agreement, to communicate these results to one another, and to suggest, if need be, amendments to be introduced therein.

Professor Ritzema-Bos¹ presented the following propositions:

1. That in each country there be established a well-organized phytopathological service through one or more vegetable pathological laboratories, which, by employing special scientists, would be capable of coöperating in international problems.

2. That in each country a sum be set aside annually to defray the expenses of one or more delegates to an international congress of vegetable pathology to be held alternately in the different countries.

3. That the different countries contribute to an international periodical on vegetable pathology, edited by the division of phytopathology of the International Institute of Rome, giving a review of all the important publications on this subject which have appeared in the different countries, also information, furnished by the different countries, on the appearance of important injurious plant and animal diseases.

4. That in the different countries everything possible be done to disseminate among farmers and horticulturists information on the most important injurious plant and animal diseases and means of preventing and combatting them.

Professor Comes thinks it will be difficult to establish international measures which will answer the requirements without seriously¹ in-

¹ Actes de la quatrième assemblée générale, Institut International D'Agriculture, Rome, 6-12 Mai. 1913.

dering the commerce of the different countries. Since most of the parasites, animal and vegetable, are more or less scattered in every country, he thinks the work of the International Institute of Agriculture should be along the following lines:

1. To make inquiries to decide what parasites, especially animal, are most dangerous and most likely to be spread, in what definite regions they are found and what regions are free from them.

To publish in the bulletin on Agricultural Information and Plant Diseases the results of these inquiries.

2. When the Institute, through publications, direct correspondence, or by any other means, shall learn of the existence in a certain region of a parasite until then unknown, it shall

- a. Verify the information;
 - b. Determine the extent of the ravages caused by the parasite;
 - c. Publish the results of these inquiries for the purpose of calling them to the attention of those interested;
 - d. Finally, that this important object may be properly accomplished, it is necessary that the Bureau of Agricultural Information and Plant Diseases shall be provided with an adequate technical personnel.

Apparently the thought of truly international studies, through the interchange of specialists by the various countries, has not yet been expressed in these European deliberations.

Prof. L. R. Jones,¹ of the University of Wisconsin, has well expressed the American viewpoint:

"There is, however, a broader aspect of international phytopathological problems which has not had adequate general recognition. The recent passage of the Simmons bill shows that, in some degree at least, this is dawning upon our national consciousness. This very bill, however, emphasizes the necessity for studying phytopathological problems in their international relations. Two things are especially needed to this end. First, administrators as well as investigators should recognize the importance of occasional visits by the American investigator to such foreign countries as will enable him to see his problems in their foreign setting. The relation of environment to the predisposition of the host, as well as to the virulence of the parasite, can not be over-emphasized and it is often impossible for the investigator of the local problem to realize this except as he may be temporarily translocated.

"Even more should our administrators see from time to time how great may be the gain from temporary or permanent employment of foreign experts. This has been done in the Department of Agriculture

¹Science, July 4, 1913. pp. 5-6 (A Plea for Closer Interrelations in our Work).

See also Shear, C. L. Some observations on phytopathological problems in Europe and America. *Phytopathology*, v. 3, pp. 77-87. April, 1913, and
Orton, W. A. International phytopathology and quarantine legislation. *Phytopathology*, v. 3, pp. 143-151. June, 1913.

often enough and with sufficiently favorable results to justify its further trial. But there are inherent difficulties in the appointment of foreigners to permanent government positions and, moreover, the best of foreigners of mature experience can not be thus transplanted. Neither of these difficulties, however, arises in relation to the temporary employment of foreign experts. It seems to me that the time has come when this should be done with increasing frequency. It would result not only in giving us promptly the best expert advice for immediate application, but, what is scarcely less important, would give the foreign specialist such an understanding of the American problem as would make his further investigations more broadly inclusive of American conditions and insure results proportionately more valuable to us. Every student of the history of plant pathology recognizes the gain to England directly, and to science indirectly, which came from the employment of DeBary by the Royal Agricultural Society as expert upon the problems which arose in connection with the potato disease. Who will measure the advantage to American plant pathology could we have had a professional visit of inspection with obligation for counsel from Aderhold, when he was at the height of his understanding of German orchard pathology; or who will estimate the stimulus to our progress upon cereal rust studies could we have brought Ward to America for even a brief sojourn when he was probing deepest into their fundamentals, providing he came commissioned and committed not alone to see but to advise? Surely if exchange professorships are scientifically and economically justifiable in any field, they are in plant pathology."

THE GIPSY AND BROWN-TAIL MOTH QUARANTINE

By D. M. ROGERS, *Boston, Mass.*

A brief statement follows of what is being done by the U. S. Department of Agriculture to prevent the spread, by the inspection of various products, of these two European insects which have become established in parts of New England.

The passage of the Plant Quarantine Act of August 20, 1912, made it possible to put into effect a quarantine of the areas in New England infested with the gipsy moth and the brown-tail moth. This was done by the Federal Horticultural Board and became effective on November 25, 1912.

There had been for nearly two years prior to that date a semblance of such a quarantine by agreement with the transportation companies doing business in the gipsy moth area, and the way partially smoothed

for the more rigid quarantine declared in notices No. 4 and No. 10, which clearly define the areas from which forest products and nursery stock may be shipped only when accompanied by a certificate of inspection, and prohibit the movement of Christmas trees and greenery grown in the territory infested with the gipsy moth to points outside of it.

The area quarantined on account of the gipsy moth includes parts of Maine, New Hampshire, Massachusetts and Rhode Island, about 15,230 square miles. The brown-tail area includes all the gipsy moth territory and about 17,000 square miles additional affecting portions of each of the New England States.

The area quarantined was divided into fifteen sections for forest product inspection, and a competent man assigned to each section. His duties were to visit the agents of all railroad, express and boat companies, and the more important dealers in commodities which require inspection and to instruct them regarding the movement of goods affected by the quarantine, and to inspect such material before shipment.

The railroads issued a circular to their agents, copying the regulations of the quarantine in full, with a small map attached showing the areas affected, and in addition extracts from the nursery laws of several states and Canada.

The entire machinery worked promptly and effectively with almost no friction and general hearty coöperation.

Aside from the fifteen sections in which the agents of the Department were looking after the movement of forest products, a man or a crew of men, as the case demanded, was assigned to the inspection of stock going out from the nurseries within the quarantined area.

Each agent of the Department has a metal badge showing that he is an officer, is provided with blanks for making applications for inspection and certificates to accompany shipments examined. The application and certificate have corresponding serial numbers. The application is returned to the office and filed so that we have a record of the whole transaction. In the case of nursery stock, the tag certificate issued has a serial number, and a sheet, report of inspection, shows the same number and other information which we require. These sheets are returned to the office and a copy is sent to the State Inspector into whose state the goods are to go, so that the stock may be reexamined at destination, if desired.

A few days less than a year after the quarantine was put into operation, the first report of any moths having escaped the notice of our inspectors was received from New York. Some of Mr. Atwood's eagle-eyed inspectors found a gipsy moth egg-cluster and a brown-

tail web on a earload shipment of *crataegus* from the Arnold Arboretum, Boston, Mass., to the Park Department of Rochester. The ear and contents have been returned to the shippers.

While it is not the wish of the writer to make excuses for any negligence of the Federal force of inspectors, there seems to be a feeling that trees were put into the ear which had not been inspected. We shall try not to have it happen again, and want to thank the New York force for finding the insects before they had become established.

The inspection of plants and forest products includes the examination of lumber, cordwood, logs, poles, posts, bark, pulp wood, rough lumber used in crating finished products, barrel hoops, second-hand barrels and boxes, cable reels, and other products which might be chosen by a gipsy moth as a place to deposit her eggs. Many commodities not strictly included in products of the forest are examined. There are a number of quarries in the area from which the shipments of stone for monumental work, building, paving, etc., are made: as these quarries are often located in woodland or have trees near them which are infested, many egg-clusters are deposited on the stones. Our men are constantly scouring their territories in search of similar possibilities.

Occasionally, we get application for inspection of a carload of kindling wood. Any of you can realize that it is a rather long, monotonous task to examine such a shipment, but the men are somewhat consoled in thinking it is not shavings or sawdust. Not long ago eighty hours of work were consumed in looking over, piece by piece, a carload of staves and heads of firkins to be used in packing fish or pickles in Ohio, from which 12 gipsy moth egg-clusters were taken.

Cars in which shipments of lumber or wood have been moved from one point to another within the quarantined area are frequently littered with bark which has been broken off in unloading, and need to be cleaned before reloading with goods destined beyond our lines. The railroad agents in most cases are careful to look after the sweeping, but we have had cases where it has been necessary to have the ear unloaded and cleaned before a certificate was issued. In some cases where many earloads of rough lumber or cordwood are to be moved, arrangements have been made with the railroad to use only the same cars to and from the points until the whole lot is transported.

It is now a little more than a year since the quarantine went into effect and there have been issued about 5,000 certificates for forest products, some for a single stick, and a great many for earloads! From these shipments, 2,573 gipsy moth egg-clusters have been removed. During the same time about 7,000 tag certificates have been issued for nursery stock, some for only a handful to go by mail, and many

for earloads, and 237 egg-clusters and 322 brown-tail webs have been taken.

We sent a small crew of men through the market garden districts to inspect boxes, crates, and barrels used by the truck growers in shipping their products. From these 138 egg-clusters were taken.

The areas quarantined at present include nearly all the nurseries in New England. There are a few large ones in Connecticut outside the lines. At the principal nurseries we keep men constantly during the shipping season. The smaller ones, from which only occasion shipments are made, are visited, on request, by the nearest inspector.

When the inspectors are not busy looking over stock going from the packing sheds, their time is spent among the growing stock and enough assistants given them to examine all plants during the autumn. The evergreens are done first for the gipsy moth, and later, as the leaves fall, the deciduous plants are examined for gipsy moth egg-clusters and brown-tail webs. This gives a double inspection and helps a great deal in keeping the moths from breeding on the growing stock. Our records show that 3,280 egg-clusters and 5,749 brown-tail webs were removed during the 1913 examination. During the summer there are enough gipsy moth caterpillars and brown-tail adults blown in to make the inspection necessary each year.

While our system is not entirely perfect, we are covering the territory carefully and inspecting the commodities which are the most exposed to infestation.

A FEW PROBLEMS IN CONNECTION WITH THE ADMINISTRATION OF THE MINNESOTA INSPECTION LAW

By F. L. WASHBURN and A. J. SPANGLER, *Nursery and Orchard Inspection Service*

During the winter of 1912-13, the Minnesota State legislature passed a bill relative to the inspection of Minnesota nurseries and foreign stock which, in most of its provisions, fulfills the requirements and is working satisfactorily. The inspection is compulsory upon all nurserymen and all imported stock; that is, stock grown outside the United States or Canada. The entomologist is further empowered to enter any premises, whatever, if he deems it necessary and order infested material, whether shade trees, orchard trees, shrubs, or plants, treated, or, if treatment is not practicable, is authorized to order the owner to destroy such plants or trees. This power should be, and will, we believe, prove, a potent factor in the control of shade tree pests upon private grounds whose owners are indifferent,—a most important problem in Minnesota at present. Our appropriation is rather small,—only \$3,000 per annum for the next biennium,—with the privilege of drawing upon the State

Entomologists' Fund, if necessary. Consequently, if we had to proceed against many individuals, unwilling to comply with the law, we would, in view of the fact that the infestation of Minnesota oaks is very widespread, be seriously embarrassed for want of funds.

More important in this discussion than the fact of lack of funds, a fault which we hope will be remedied at the next session of the legislature, are certain points in connection with the law which, at the present time, are subject to criticism, even on the part of those who are responsible for the wording of the law and the carrying out of the provisions therein. These problems we lay before you, hoping to receive from you helpful suggestions and perhaps being, in a small way, responsible for at least a few ideas welcome to inspectors at this meeting. Some of our problems many of you have doubtless solved, and you may smile at the fact that they present difficulties to the Minnesota officials; nevertheless, please regard us as suppliants before you, asking for suggestions born of your experience and we hope you will respond generously to our request.

The first criticism that we have to make upon our new law, as well as upon the wording of the law in some of the other states, is that the term "nursery" is not defined, leading to embarrassing inquiries, at times, as to whether we are dealing with a nurseryman or a dealer — the latter not being entitled to a regular certificate such as we grant nurserymen. We have been obliged to meet more or less criticism this year from men whom we designate as dealers and who, in consequence, by the wording of our law, are necessarily restricted in the scope of their business. Manifestly, a man who can show the inspector one quarter of an acre of land which, indeed, he may rent and not own and on which he has planted left-over stock, is not a nurseryman, but a dealer; but let him stick into the ground a dozen or fifty willow cuttings and, technically, he has a nursery for he is "propagating stock for sale" and on a legal technicality, is entitled to a regular nurseryman's certificate. To grant such a certificate, under these conditions, would be manifestly absurd and to guard against such a contingency and, at the same time, be generous in our attitude, we have decided to give a nurseryman's certificate to any seller of nursery stock who can prove to us that he propagates upon his premises, owned or rented, at least 50 per cent of the stock which he sells. If he buys more than 50 per cent he is entitled only to a dealer's certificate. This decision was arrived at after first consulting our attorney-general who declared, in the absence of any definition in our law, that it is evidently within the province of the state entomologist to determine what is a nursery and what is not, and after interviews with many of our leading and well-established nurserymen recognized as responsible business men,

all of whom concurred in the statement that they only imported from 5 to 10 per cent of the stock sold, such per cent, occasionally, in exceptional years, running a little higher, possibly amounting to 15 per cent, rarely to 20 per cent. All of these nurserymen agreed that if any citizen selling nursery stock could prove that he raised half of what he sold, he should be entitled to a regular certificate and not merely be regarded as a dealer. This problem, therefore, is virtually solved. It must be borne in mind, however, that a few cuttings thrust into the ground by a dealer, might, in view of a decision of one of our Supreme Courts, transform a dealer into a regular nurseryman and be the cause of reversing any decision that the state inspector had made to the contrary.

Another problem, and one which constitutes a serious criticism upon our law is found in section 7, which provides for a special certificate for dealers and florists but obliges them to purchase all their stock from Minnesota nurseries or to sell under said certificate foreign stock (that is, European), inspected in Minnesota. That this section is not carefully framed must be evident to every one of you. Worded, primarily, to meet the needs of firms who bought stock of Minnesota nurseries for immediate selling, or imported stock for that purpose from Europe, with perhaps the additional view of preventing unscrupulous dealers from buying non-hardy stock from any source whatever, it nevertheless works a hardship upon honest dealers,—and there are many such—by obliging them to buy all their American grown stock in Minnesota. This is manifestly an injustice and we shall seek to have a change in this section at our next legislature.

Whether or not the inspector should feel privileged or is justified in interpreting the wording of the law in such a way as not to allow it to work a real hardship in individual cases is perhaps another problem. As one of a number of examples which might be cited, section 6 of our law declares it to be unlawful for any party to open a package containing foreign stock unless the inspector or deputy is present and since shipments from abroad frequently arrive in such large numbers at one time that our force cannot immediately comply with all the calls sent in, these consignments would suffer if the consignees were compelled to leave them boxed waiting for our coming. In extreme cases, therefore, we have allowed them to unpack this stock while waiting for our inspectors.

We have been somewhat embarrassed by the fact that small consignments of European stock, not inspected in the state to which they are originally consigned from New York, have been forwarded to individuals in Minnesota, obliging us to take several long and comparatively expensive trips to inspect, possibly, one box of stock in each town. For example, a large consignment shipped to brokers at Mil-

waukeewau was reshipped by this firm to separate individuals in Minnesota, namely, parties at Red Wing, Lake City, Austin, Waseca, Virginia, Winona, and Mankato, embarrassing us as before outlined. Is it not possible to avoid this by having such stock inspected at port of entry,—in this individual case,—in Milwaukee? If this is not possible, we could still be relieved of much travel and expense if it were regarded safe to exempt from inspection azaleas and possibly hydrangeas also, since many of these shipments consist of these shrubs.

In the same line, we might mention the fact that we do not pretend to go to the expense of time and travel necessary to inspect shipments received from quarantined areas in the Eastern States, notice of all of which we receive in the shape of yellow slips signed by D. M. Rogers. In view of the fact that these consignments have been inspected by both federal and state officers, we feel relieved of the responsibility of examining them upon their arrival in Minnesota. We would be glad to hear of the practice of other inspectors in this connection.

The Minnesota law requires the filing with the state entomologist of "a copy" (it should be "a duplicate") of the certificate of any firm outside the state shipping nursery stock into Minnesota to be sold or distributed. We hardly see how it is possible to enforce this. In other words, how can we make sure that we receive all of these copies required by the law? We would like to hear the expressions of others upon this point.

Other minor problems which have caused us more or less serious consideration are the following:—Is it feasible to encourage the passage upon the part of legislatures of an act imposing a penalty for knowingly having any imported or native insect pests (naming certain particularly destructive insects) upon one's premises? Michigan, we believe, has such a law and we should be glad to learn how it has worked.

Again, is there any objection born of the experience of any of the inspectors, to permitting nurserymen, in printing copies of certificates to leave out the dates and certificate numbers and fill in these blanks later with pen, in order to allow them to print a large number of tags at once and avoid the loss of left-over tags at the end of the year? The larger nurseries are not concerned over this and the above requests have been made of us only on the part of some of the nurserymen whose shipments are quite limited. Some of these,—a few—are known to do this and, so far, we have not offered objections. A suggestion which comes from one of our nurserymen is to the effect that the State Inspection Service might furnish small electrotypes (costing about 15¢ each) about $1\frac{1}{2} \times 2$ inches, to the nurserymen, one to each, with the words "Inspected. Minnesota, F. L. Washburn, 1913,"—the original copy of certificate being in each case on file with the nurseryman. His

suggestion was based upon the fact that to print the entire certificate on a small tag to accompany a small parcel-post shipment is embarrassing, occupying as it does, so much room; and a needless expense—calling for a tag sometimes really larger than the package itself. He would much prefer a small tag with firm name, caution as regards frost and heat, and the above stamp, leaving plenty of room thereby for postage. This would be a convenience and a saving and might be done upon intrastate shipments in Minnesota, for the law (another point to be criticized) reads “accompanied by a certificate of inspection” and not “copy of certificate”; but we have pointed out to this party that the wording of the laws of most of the other states and the wording of the federal law is such as to require an actual copy of certificate granted.

A prominent firm in Minneapolis has recently received, from a New York firm, a consignment of 2,000 roses largely or entirely infested with crown gall, reported by our Plant Pathology Division as identical with crown gall of the apple. This package was accompanied by a copy of a New York certificate.

We pointed out to a representative of the firm receiving the roses the dangers of using these plants and he, of his own initiative, refused to accept them, and the firm referred to has had them returned, writing us an indignant letter to the effect that they had never known crown gall to infest roses; that the theory of its being contagious was still in doubt, that these roses did not come from their own grounds and hence they had not seen them, and stating finally that, since these plants were to be potted and used for forcing and then thrown away and not planted in other grounds, there could not, by any possibility, be a chance of sound rose plants being infested.

In writing them I deemed it necessary to contradict several of their statements particularly the last, for it is quite a common practice to plant these forced rose bushes outside, in the spring, where they thrive, blossoming every year. Had the consignees not refused to take them, or had the New York firm left them in Minnesota, we should have destroyed the consignment. Now, some state may receive this same lot. Is there any inspector here willing to permit them to remain in his territory? This really presents no *problem*, yet I mention it here desiring to know what action would have been taken by other inspectors under similar circumstances.

NURSERY AND ORCHARD INSPECTION WORK IN MISSOURI

By LEONARD HASEMAN, *Columbia, Mo.*

For a number of years fruit growers and nurserymen in Missouri have attempted to decide on an adequate inspection law, but for various reasons, the most important of which was lack of enthusiasm and overabundance of friction, nothing of importance was done. In 1899 and again in 1901 inadequate bills were passed by the legislature, and in 1908 and 1910 unsuccessful attempts were made to pass a better law.

With the passage of the Federal Quarantine Act, and the more strict enforcement of state laws it was finally absolutely necessary that something be done to provide for adequate nursery inspection work. Other states began to refuse to accept Missouri inspection certificates since there was no state law which could compel unscrupulous nurserymen to honor the certificates which they received from the inspector. There was also no provision for regulating the introduction of stock into the state or for inspecting such shipments as might need it. In fact, Missouri was for years a national dumping ground for nursery stock which could not be disposed of elsewhere. This unloading of undesirable nursery stock has gone on for years, and it, together with the distribution of similar home-grown stock by a few of our unscrupulous nurserymen, has provided the state with a goodly supply of all nursery and orchard insects and diseases capable of maintaining themselves in this climate, which includes about all of the horticultural pests found in this country. Missouri is fortunate, however, in having so many progressive nurserymen who are awake to the necessity of having effective inspection, and they are very largely responsible for the passage of the present state inspection law.

During the fall and winter of 1912 the writer devoted considerable time to a study of the nursery inspection laws and systems in the various states where this work is properly handled, with a view of preparing a law which would be as nearly uniform as possible with the present laws of other states. The first complete draft of the law was submitted to the nurserymen of the state, during the annual meeting of the Western Association of Nurserymen, for their consideration. A number of outside nurserymen were also called on for suggestions. The only objection of any importance was as to the manner of the administration of the law. The State Agricultural Experiment Station was placed in charge of the work and at first there was some objection to this, but in time the nurserymen as a body united with the State Board of Horticulture representing the horticultural interests of the state and secured the passage of the bill.

The Missouri law was framed to meet Missouri conditions first of all, and it does this very well we believe. It was made as broad as possible so as to take care of future conditions not now foreseen, and still it is sufficiently explicit to properly cover present conditions. It has a few provisions not found in all state inspection laws, and some have been omitted, whose only value is to attract attention and create undesirable objection. It was framed to accomplish results with as little friction as possible. A brief survey of some of its more desirable features may be of interest to those in charge of the inspection work in other states, and especially to those interested in the revision of old or the passage of new inspection laws.

The law provides, first of all, for two distinct and definite lines of work—police duty and education. It provides properly for the enforcement of the police work and when necessary that power will be exercised, but we believe that much of that more or less disagreeable work can be more successfully carried out by the proper administration of the educational phase of the work. We hope to accomplish more through education than through the courts of law. It was this opportunity for carrying out a state-wide campaign of education that induced the Agricultural Experiment Station to take charge of the work.

Along the line of police duty, provisions are made for the regular annual inspection of nurseries, the condemnation of diseased or infested stock, the collection of the actual necessary expenses of inspection and a \$5 certificate fee from each nurseryman and the issuing of a certificate of inspection for stock which passes inspection. Provisions are also made for the inspection of any and all orchards or other grounds suspected of harboring dangerous insects and diseases, and the condemnation, treatment and, if necessary, confiscation of such infested or diseased stock or material. It also regulates the introduction of nursery stock by requiring all outside nurseries to secure a state permit which is issued free of charge upon receipt of the necessary papers. It also requires all salesmen or agents to secure an agent's permit to operate in the state. The law further provides for regulating the dealer or jobber business. In the past the dealer or jobber has done more to run down horticulture in the Middle West than any other one thing. The nurserymen seem unable or unwilling to regulate him, so our law has attempted it in this state. The dealer is required to file under oath a statement of the source of all his stock and file certificates covering same, and on payment of the \$5 certificate fee receives a dealer's certificate which is good for all shipments inside the state. With the earnest coöperation of all nurserymen we hope to be able to handle this oft undesired branch of nursery business in Missouri. Not a state laws attempt to reach the jobber as was shown in a recent case

where we were obliged to issue to a dealer in a neighboring state, one of our dealers' certificates to enable him to operate in Missouri. In short the law is framed so as to enable us to reduce to a minimum the chances of further introductions of pests and diseases, and the further distribution through local agencies.

The provisions for educational work require that the Agricultural Experiment Station provide demonstration work in orchard management and the protection of other property from dangerous pests and diseases. It is also required to investigate and report on such pests and diseases and to furnish lectures and printed literature on such subjects. Every effort is being made to make this one of the most important of the recent Experiment Station projects. Already the demands for demonstration work and other assistance and coöperation are pouring into this office, and they will be handled just as rapidly as possible. A keen interest is being shown in this work both by farmers and nurserymen. The station hasn't always had the coöperation of the horticultural element of the state, but this new law is sending them to us, and we believe Missouri horticulture is entering upon a new era, and that with sufficient men and means we can change Missouri from a state which has cut down more fruit trees than most states have yet planted, to the state producing the best and cheapest of orchard fruits.

One feature of the law deserving of special notice is the provision for its administration. This important work is too often placed under the control of private or political interests, and every attempt was made to prevent such an occurrence in Missouri. We also felt that for a law of this nature to carry the most weight possible it should not be controlled or unduly hampered by the nursery interest which it is meant to regulate, and at the same time to protect. Drug inspection controlled by druggists and the inspectors even appointed by them would be a mere letter head without any weight. The one institution in the state which is able to administer such a line of work without private or political influences is the Agricultural Experiment Station, and from the nature of the work and the equipment of the station it is the one logical institution to handle this particular work. The station has the men, it has the necessary equipment, responsibility, and, in our case, it is actually furnishing much of the funds needed for the first biennium. The biggest step toward uniform inspection would be to make of it in each state a regular Experiment Station project as Missouri has done. This would obviate many difficulties.

During the summer more than 125 nurseries comprising nearly 3,000 acres have been inspected. Twenty-five of the smaller and previously uninspected of these were found needing special treatment before an

inspection certificate could be issued. Most of these had or were near infestations of San José scale. To date 111 inspection certificates have been issued, 57 dealers' certificates, 96 permits to outside nurserymen and 294 agents' permits. This has kept the writer, with one assistant and one deputy, during the summer season, busy, considering the fact that we have also the college and station work to administer. We have also been busy with the shipments of foreign stock, and have begun the first of our winter demonstrations for the control of San José scale.

We feel that we have already made a slight beginning and with the continued earnest coöperation of fruit growers, nurserymen and colleagues we hope to be able to protect all home interests affected by the law, and to be of some assistance in the protecting of similar interests in other states.

PLANT-LOUSE NOTES FROM CALIFORNIA

By W. M. DAVIDSON, U. S. Bureau of Entomology, Walnut Creek, Cal.¹

Pemphigus californicus Davidson. Close observations on the habits of this species indicate that it migrates towards the end of April from the buttercup to the ash (*Fraxinus oregona* Nutt.). The third generation on the buttercup all become winged lice and forsake the plant in a body. They and their immediate progeny cause the leaves of the ash to curl in a manner similar to that caused by *Pemphigus fraxini-dipetalæ* Essig. In May, the shrivelled migrants may be found in the curled leaves together with the apterous lice of the second and third generations on the ash. These apterous lice have undeveloped eyes, the first generation of them being large bloated individuals. The third, or second apterous, generation on the ash is composed of both winged and wingless individuals.

Lachnus thujae Del Guercio. Infests branches and twigs of cultivated Thujas. In California winged lice appear in April. Collected at Palo Alto and Walnut Creek, California.

Lachnus ponderosæ Williams. Observed in abundance in August, 1912, at Glenbrook, Nev., and Tallac, Cal. (elevation 6000 ft.) on twigs and branches of *Pinus ponderosa* var. *jeffreyi* Vasey.

Phyllaphis? quercus Fitch. Mr. J. J. Davis has kindly identified this louse described and figured by him in the Entomological News, Vol. xvi, June, 1911. I have taken it in the fall on the under side of leaves of *Quercus agrifolia* Nee, the sexed forms appearing in early November. Towards the end of April, the stem mothers appear on the upper side

¹ Published with the permission of the Chief of the Bureau of Entomology.

of the leaves of *Q. agrifolia* and *Q. lobata* Nec, tightly curling over the edges of the leaf and thus forming a pseudo-gall. The second generation are wingless and remain in the gall until mature, when they leave the gall for the under side of adjoining leaves, living thenceforth unprotected except for the wooly covering characteristic of the species. I have observed this aphid in Placer, Contra Costa and Santa Clara Counties in California. In Placer Co. it infests the Interior Live Oak (*Q. wislizenii* A. DC.).

Chaitophorus sp.

Stem mother: Pale yellowish-green with two longitudinal light green stripes on the dorsum of thorax and abdomen. Antennae six-jointed (filament regarded as a joint), one-quarter as long as the body, pale, first two joints slightly dusky. Eyes small and undeveloped. Legs pale, tarsi dusky. Cornicles appearing as dusky-rimmed pores

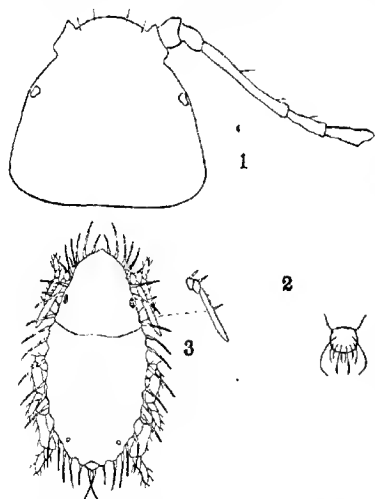


Fig. 1. *Chaitophorus* 1, stem mother, head; 2, stem mother, cauda; 3, dimorph.

on the surface of the body. Cauda globular, pale. Whole body except the head clothed with short, stout, erect white spines. Measurements: Body, length to tip of cauda, 2.00mm.; body, width (maximum), 1.16mm.; cauda, length, .054mm.; antennae, joint III, .207mm.; joint IV, .100mm.; joint V, .100mm.; filament, .024mm.

Dimorph: Entirely pale yellowish-white, flabella hyaline. Body short, oval, very flat. Eyes black, not well developed. Antennae three-jointed, distal joint three or four times as long as the two basal combined; articulations rather obscure. Legs stout, bearing hairs. Beak pale, barely reaching second coxae. Flabellae, long, two-jointed, sharply pointed at apex, narrow, the basal joint

Provisionally placed in *Chaitophorus*.

The stem mothers were observed April 13, 1913 on the leaves and stalks of *Quercus lobata* Nec. On that date they were surrounded by young of the second generation. Ten days later before any of these young had matured an invasion of Lampyrid beetles apparently

annihilated the colony of lice, but on May 30, a few dimorphs appeared. These probably belonged to the third generation. Habitat; Walnut Creek, Cal.

Eucraphis betulæ Kalt.

Stem mother: General color apple green. Body clothed with short bluish-white pulverulence (much less than in the winged female of later generations). Head olive green with a central black longitudinal stripe. Prothorax, thoracic lobes and scutellum, olive green. Eyes dark red. Antennae on frontal tubercles, a little longer than the body, black (joint I, green); basal third of joint III, thickened to include about 16 transversely-oval sensoria; joints IV and V with the usual apical sensoria. Wings large and narrow; stigma long, very pale yellow; sub-costa dark brown; stigmatic vein entire and deeply curved. Legs yellowish-green; tarsi, apical third of tibiae, apical third of middle and hind femora, brownish-black. Abdomen with almost parallel sides, not wider than the thorax; color apple green with three dusky cross-bands on the dorsum. Cornicles pale yellow, almost twice as long as broad at the base, slightly constricted in the middle. Cauda globular, concolorous with the body, slightly longer than the cornicles. Beak reaches midway between first and second coxae, pale. Sterna brown. Measurements: Body, length, 3.20mm.; body, maximum width, 1.11mm.; wing expanse, 9.37mm.; cornicles, .128mm.; cauda, .150mm.; antennae, joint I, .157mm.; joint II, .085mm.; joint III, 1.50mm.; joint IV, .814mm.; joint V, .588mm.; joint VI, .205mm.; filament, .129mm.; hind tibiae, 2.17mm.

The newly-hatched stem mothers are brownish-yellow with pale yellow appendages, thus differing from those of later generations which are bright green. The pupæ of stem mothers are reddish-yellow with dusky cornicles and four longitudinal rows of dusky spots on the dorsum.

Young stem mothers were observed to hatch from winter eggs as early as the middle of February, while the leaf buds did not open until March 1, the lice feeding entirely on the stalks. In California this species occurs on cultivated birches.

Eucallipterus arundicolens Clarke.

Winged viviparous female: Pale yellow; head pinkish; eyes dark red. Head with a median dorsal brown stripe. Prothorax pale with median brown stripe, and with two lateral longitudinal brown stripes on its anterior half. Each lateral thoracic lobe with a median brown stripe. Scutellum pale with the outer ends brown. Abdomen narrow, oval, pale yellow with a pair of dark brown tubercles on segments 2 to 8 inclusive; 9th segment with a brown median spot or stripe. Cornicles as broad as long, dark brown. Cauda pale, globular, about as long as the cornicles. Appendages; antennae about as long as the body, on frontal tubercles, pale yellow; joint I, pinkish; joint II and basal half of III, dusky; apices of remaining joints and whole filament dusky; joint III is longest; joint VI is longer than the filament; joint V longer than VI and its filament combined; five to eight transversely-oval sensoria four on basal third of joint III and the usual terminal are to be found on joints V and VI. Wings considerably exceeding the body in length; stigma, pale greenish-yellow, long, narrow; stigmal vein, absent in the middle; veins, brown; second fork third discoidal nearer to first fork than to wing apex. Legs, pale yellow throughout. Beak, reddish, reaching to first coxae. Head on under side, reddish. Sterna yellow. Pleural plate deeply lobed. The antennae alone have a white powdery covering. Meas-

urements: Body, length, 1.97mm.; body, width, .604mm.; wing expanse, 5.6mm.; cornicles, .067mm.; cauda, .061mm.; antennae, joint I, .088mm.; joint II, .086mm.; joint III, .80mm.; joint IV, .572mm.; joint V, .474mm.; joint VI, .247mm.; filament, .185mm.

Pupa: Wholly yellow with dark red eyes, and apices of antennal joints III to V brown; head with a faint reddish tinge. Antennae longer than the body. Body spinous.

This species is to be found on the under side of leaves of Bamboos (*Arundo* spp.). I have never been able to collect the sexed insects.

Myzocallis quercus Kalt. (?)

Winged viviparous female: General color, pale pea green; antennae as long as the body, pale greenish-yellow, apices of joints III to VI and whole of joints I and the filament, black; joint III, longer than IV and V together. Thorax of slightly darker green than the abdomen. Wings long and ample; veins slender, brown; stigma with a faint brownish cloud and with a basal black spot; stigmatic vein entire; apical cell of the wing rather small. Legs, yellow or yellow-brown; tarsi, dusky brown. Abdomen with three pairs of short dusky tubercles on the dorsum of segments one to three inclusive; the pair on segment three about twice as long as those on segments one and two. Cornicles black, in some individuals the base is pale; as wide at the base as long, slightly tapering toward apex. Cauda, concolorous with the body; globular, not as long as the hind tarsus, but about equal in length to the cornicles. Beak, pale, tip black, extending not quite midway between first and second coxae. Sterna, pale green. Sensoria as follows: III, 7; IV, 0; V, usual apical; VI, usual apical. Measurements: Body, length, 1.78mm.; body, width, .69mm.; cornicles, .052mm.; cauda, .055mm.; antennae, joint III, .570mm.; joint IV, .286mm.; joint V, .250mm.; joint VI, .117mm.; filament, .076mm.

Described from specimens collected October 25, 1912. Oakland Cal., on *Q. robur* L.

Pupa of winged viviparous female: Pale green, wing-pads, white; dorsal tubercles absent; abdomen, armed with slender capitate spines; cornicles, slightly dusky.

Oviparous female: Pale lemon yellow; posterior half of the body with a pinkish or orange-colored tinge; eyes, red; antennae half as long as the body, pale; distal ends of joints IV to VI and apex of joint III, black; filament, dusky; tarsi brown; hind tibiae, somewhat swollen; caudal segments of the abdomen drawn out into a conical tube; cornicles, concolorous with the body or somewhat dusky, varying in de-

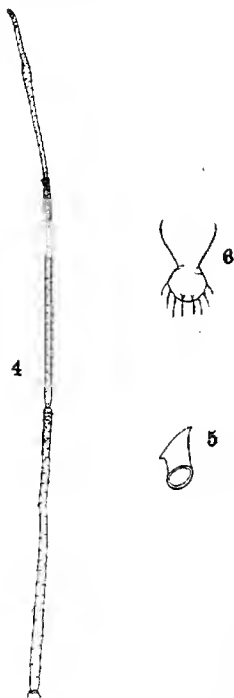


Fig. 2. *Eucalypterus arundinifolius*; 1, winged viviparous female, antenna; 2, cornicle; 3, cauda.

of duskiess, as wide at the base as long; cauda, pale, globular, as long as cornicles; cephalic margin of head with four capitate hairs; margin of abdomen with a few short capitate spines; beak, pale, tip brown, extending beyond hind margin of pronotum. Measurements: Body, length, 2.45mm.; body, width, 1.12mm.; cornicles, .060mm.; cauda, .060mm.; antennae, joint III, .410mm.; joint IV, .205mm.; joint V, .175mm.; joint VI, .133mm.; filament, .130mm. On some specimens (the older ones) the orange-colored abdomen is very pronounced.

Described from six specimens collected November 12, 1912. Oakland, Cal., on *Q. robur* L.

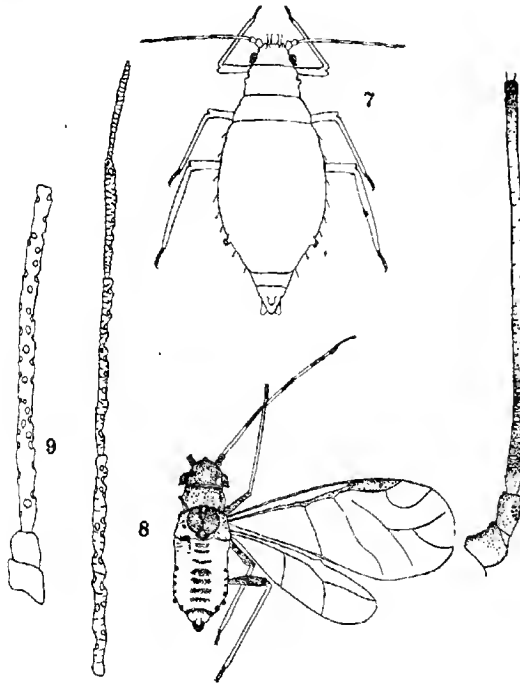


Fig. 3, *Myzocallis quercus* (?); 7, oviparous female; 8, winged male; 9, winged male, antenna.

Winged male: General color, pale yellowish-green; eyes, bright red; basal points antennae pale, distal joints, dusky or black; head, prothorax, last two abdominal segments, dark green, olivaceous; thoracic lobes, scutellum, cornicles, and seven transverse bars on abdominal dorsum, black; a row of black spots on each side of abdomen; veins of wings narrow, brown; stigma, brown; stigmatic vein, entire; veins I and II, thick; legs, pale greenish-yellow; femora and tarsi, dusky brown. Sclerites as follows; III, 27-30; IV, 8-10; V, 9, 10; VI, 4, 5. Measurements: Body, length, 1.33mm.; body, width, .47mm.; wing expanse, 4.40mm.; cornicles, .028mm.;

cauda, .0316mm.; antennæ, joint III, .512mm.; joint IV, .297mm.; joint V, .255mm.; joint VI, .113mm.; filament, .145mm.

Described from four specimens collected October 25, 1912. Oak-land, Cal., on *Q. robur* L.

I include this plant louse in this article in the hope that some aphidist can help me in the determination of the species. I can not identify it with any American louse and conclude that the species is European as it occurs only on oaks imported from Europe. The aphid seems to approach *Myzocallis quercus* Kalt. and I have listed it under this name in former papers (Journal Econ. Ent. August, '09 and August, '10). Also it is not this species, but another, that infests the native oaks.

Monellia caryella Fitch. Infests the under side of the leaves and the nuts of *Juglans californica* Watson. Collected at San José and Walnut Creek, Cal. Kindly determined by Prof. H. F. Wilson.

Aphis longtonensis Throop. What seems to be this species infests and curls the terminal leaves of wild currant (*Ribes sanguineum* Pursh.) in the canyons of the hills of Contra Costa Co., Cal.

Aphis frigida Oestl.

Stem mother: Black or very dark green, covered with fine white bloom and short capitate hairs or spines. Antennæ black, reaching to base of cauda; joints II and III (except apex) yellowish-brown; eyes, black; first antennal joint somewhat gibbous;

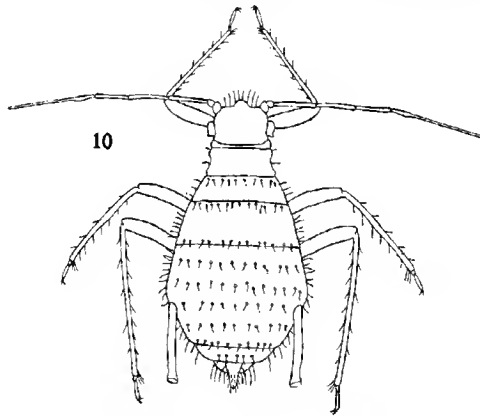


Fig. 4, *Aphis frigida*; stem mother (unshaded).

prothorax, with small blunt lateral tubercles; legs, black; anterior femora, yellowish-brown; cornicles, black, nearly four times as long as the cauda, their apices conspicuously flaring; cauda, dark green, ensiform. The young individuals are pale green with white pulverulence. Measurements: Body, length, 1.57mm.; body, width,

.57mm.; cornicles, .443mm.; cauda, .130mm.; antennae, joint III, .26mm.; joint IV, .25mm.; joint V, .236mm.; joint VI, .125mm.; filament, .443mm.

Collected singly on *Artemisia californica* Less. at Walnut Creek, Cal., April 8, 1913. Colonies of *Macrosiphum frigidum* Oestl., were present on the same plants. This latter species is never pulverulent.

Aphis atriplicis L.

Stem mother: General color, pale green; body covered with rather sparse white bloom; body, elongate-oval; head, eyes, legs, antennae, cauda and cornicles, black or dark brown. Cornicles slightly exceeding antennal joint V in length, not much widened in the middle, somewhat curved. Cauda, tapering. Measurements: Body, length, 2.42mm.; body, width, 1.10mm.; cornicles, .097mm.; cauda, .136mm.; antennal joint III, .186mm.; joint VI, .077mm.; joint V, .088mm.; joint VI, .088mm.; filament, .126mm.

Described from several specimens collected April 7, 1913, Walnut Creek, Cal., in curled leaves of *Chenopodium murale* L. and *C. album* L.

Aphis bakeri Gillette. During the fall and winter months I have collected this species in abundance on a large variety of plants, mostly Compositae. It occurs on sunflowers, artichokes, *Gnaph-*

alum, *Senecio*, *Artemisia*, *Anthemis* and *Amsinckia*. It seems peculiar that a species inhabiting legumes and pomaceous fruits east of the Sierra Nevada Mountains, should have such a different range of food-plants on the Pacific Coast. I have never found this louse on either pomaceous fruits or clovers in California. Prof. H. F. Wilson¹ reports it from both these hosts in Oregon. The summer life history of the louse in California has yet to be fully studied. On German Ivy (*Senecio* sp.), at least, it seems to exist the year around and the annuals are infested by migrants from it. I am indebted to Messrs. J. J. Davis and H. Morrison for the determination of this species.

Hyadaphis xylostei Schank. Syn. *Hyadaphis conii* Davidson.

¹Biennial Crop Pest and Horticultural Report 1911-1912, Oregon Agricultural Experiment Station, p. 89.

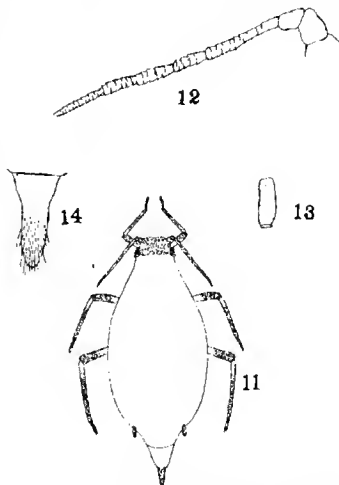


Fig. 5, *Aphis atriplicis*; 11, stem mother; 12, antenna; 13, cornicle; 14, cauda, of stem mother.

(*Siphocoryne conii* Davidson "Notes on the Aphididae in the vicinity of Stanford University;" Journal Econ. Ent. August, 1909). Close examination of specimens coupled with field observations have satisfied me that the species on *Conium maculatum* described by me as new is identical with the European honey-suckle louse.

Rhopalosiphum nervatum Gillette. A very abundant rose louse at Walnut Creek, Cal., attacking both wild and cultivated roses. I am indebted to Prof. C. P. Gillette for the determination of this species.

Rhopalosiphum corylinum sp. nov.

Winged viviparous female: General color, apple green; head and thoracic lobes, dark green; the former, with a brownish tinge; prothorax, darker than abdomen,

but not so dark as head and thoracic lobes; scutellum, dark green; antennae, longer than the body, on frontal tubercles, dusky green; joints I, II and extreme base of III, pale green; eyes, dark red; wings, of moderate size, venation normal; stigma, long and narrow, pale greyish-green; veins, dark brown; legs, pale green; femoral and tibial apices and tarsi, dusky grey; cornicles, nearly one-third the length of the body, slightly enlarged at distal two-thirds, base, pale; apical, two-thirds dusky; cauda tapering, the apex upturned, pale green; beak, reaches beyond second coxae. Sensoria: Joint III, twenty-four to thirty, small, disposed along almost the entire length of the joint, circular; usual apical ones on joints V and VI. Measurements: Body, length, 2.16mm.; body, width, .83mm.; cornicles, .63mm.; cauda, .19mm.; antennae, III, .80mm.; IV, .47mm.; V, .50mm.; VI, .143mm.; filament, .83mm. Described from many individuals.

The pupa, winged viviparous female: Pale green with a dorsal longitudinal stripe of darker green; antennae, as long as body; articulations and whole of joints VI and filament dusky; elsewhere pale greenish-white; head dark green; wing-pads, white; abdomen, often thickened at distal two-thirds, pale greenish-white; legs, white; tarsi, dusky; cauda, pale, conical. Length of body, 2.44mm.; cornicles, .57mm. Described from numerous specimens. The apterous form is pale greenish-white.

This species infests the under side of the leaves and the terminal shoots of wild hazelnut (*Corylus rostrata* Ait.). Collected May 20, 1913, near Walnut Creek, Cal.

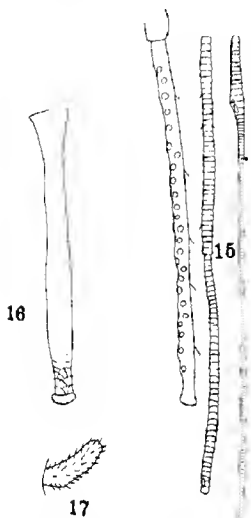


Fig. 6, *Rhopalosiphum corylinum*; winged viviparous female; 15, antenna; 16, cornicle; 17, cauda (from side).

Myzus fragaefolii Ckll.

Oviparous female: General color, pale lemon yellow; older individuals, pale orange; body spindle-shaped; antennae reach base of cornicles, pale; two distal joints, dusky. Eyes, very dark red; head, paler than the rest of the body with whitish powdery covering; whole body armed with short capitate spines; cornicles long, slender, slightly curving near the apex, cylindrical, white, the tip dusky; cauda, short, tapering, dusky. Measurements: Body, length, 1.42mm.; body, width, .66mm.; cornicles, .336mm.; cauda, .130mm.; antennae, joint I, .088mm.; joint II, .051mm.; joint III, .514mm.; joint IV, .200mm.; joint V, .193mm.; joint VI, .080mm.; filament, .687mm. Described from many specimens.

Winged male: Head and thorax, black; abdomen, dark red with sparse whitish bloom and darker cross-bands on the dorsum; eyes and antennae, black; dorsum of meso-thorax with white bloom; frontal tubercles and first antennal joint, porrect; front margin of head prominent; wings, extending far beyond abdomen; stigmae, short, rather broad, white; second fork of third discoidal equidistant from first fork and wing apex; first fork equidistant from wing apex and origin of third discoidal; stigmatic vein short, curved deeply; insertions

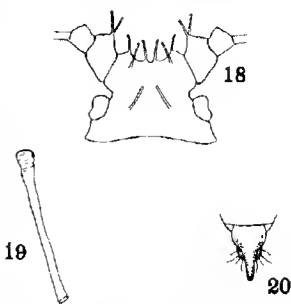


Fig. 7. *Myzus fragaefolii*: oviparous female; 18, head; 19, cornicle; 20, cauda.

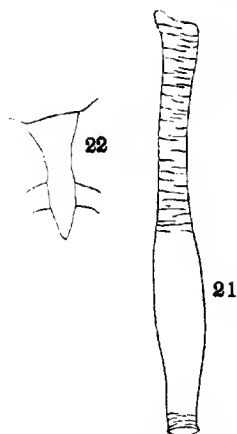


Fig. 8. *Amphorophora rubi*: winged viviparous female; 21, cornicle; 22, cauda.

white; legs, pale yellowish-brown; knees, tarsi, base and apex of tibiae, black; cornicles, long, narrow, cylindrical, dusky; cauda, one-third as long as cornicles, dusky, tapering. Sensoria as follows: Antennal III, about twenty small, irregularly disposed; antennal IV, about six similar; antennal V and VI, usual terminal. Measurements: Body, length, 1.20mm.; body, width, .43mm.; cornicles, .32mm.; cauda, .11mm.; wing expanse 5.54mm.; antennae, joint III, .420mm.; joint IV, .254mm.; joint V, .254mm.; joint VI, .121mm.; filament, .478mm. Described from two specimens. *Eggs*: Black, shining, elongate, size .58mm. x .24mm.

The sexed forms were observed in January and February, 1913, and were the predominant form during these months. The oviparous females far outnumbered the males. Eggs were deposited during these months on the lower surface of the strawberry leaves, and these hatched in March. At Walnut Creek, Cal., the spe-

cies was observed to infest leaves and tender stalks of cultivated strawberries.

Phorodon galeopsidis Kalt. Infesting the under side of the leaves of *Polygonum* sp. Collected July 25, 1912, at San Jose, Cal.

Amphorophora rubicola Oestl.

Collected on the leaves and terminal shoots of thimble-berry (*Rubus nutkanus* Moc.), May 13, 1913, in hilly canyons of Contra Costa Co., Cal. At that date about 95 per cent. of the lice were large pupae or recently transformed adults. The dusky spot at the apex of the wing mentioned by Oestlund (Synopsis of the Aphididae of Minnesota, 1887) was present in all alate specimens examined.

Macrosiphum ludoviciana Oestl. What I take to be this species was observed infesting *Artemisia heterophylla*. The lice appeared first about February 6, 1913, at which date the plants were about eight inches in height. Toward the end of the month winged forms were produced and these migrated to other plants, the original centre of infestation in the area of plants under observation being confined to one plant. Several plants were destroyed by the lice settling in masses on the growing stalk but finally towards the end of April all the lice either left the area of plants under observation or were destroyed by enemies. Locality: Walnut Creek, Cal.

Macrosiphum rudbeckiae Fitch. This louse in California seems to confine itself to the teasel (*Dipsacus fullonum* L.). I have collected it on many occasions in the vicinity of San Jose, California.

ADDITIONAL EXPLANATION OF FIGURES

Camera lucida drawings, nos. 1, 2, 4, 9, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22-eyepiece no. 1, objective 16mm.; nos. 3, 5, 6-eyepiece no. 1 (tube 170mm.), objective 16mm.; nos. 7, 8, 11-eyepiece 1, objective 3in.; fig. 10-eyepiece no. 1 (tube 170mm.), objective 3in.

THE LIFE HISTORY OF THE SUGAR-BEET ROOT-LOUSE (PEMPHIGUS BETAE DOANE)¹

By J. R. PARKER, *Montana Experiment Station*

Considering how scanty is the knowledge of life histories in the genus Pemphigus, it is thought worth while to set before the entomological public the life history of the economically important species, *Pemphigus betae* Doane. This species is the most important pest of the sugar beet in Montana and each year does considerable injury, the tonnage in badly infested fields sometimes being reduced a third. A study of its life history was begun as an Adams project in 1909, but not until the past summer were all the stages in its complex life cycle known.

¹ The investigations upon which this paper is based were carried on at the Montana Experiment Station as an Adams project under the direction of Professor R. A. Cooley, Station Entomologist.

This paper will deal only with the life history, while technical descriptions, studies in synonymy and a discussion of control measures will be reserved for future publication.

WINGLESS VIVIPAROUS FEMALES—VIRGOGENIA OF EUROPEAN WRITERS

Early in the spring the full grown, subterranean, wingless, viviparous females which have survived the winter, begin to give birth to living young which also develop into wingless viviparous females. This rapid method of reproduction continues throughout the summer and is checked only by cold weather, lack of food or unfavorable soil conditions. A very wet spring may result in the death of all the hibernating lice, while in a dry spring they may feed and develop upon rootlets left in the ground from the previous season until the new crop of beets offers them more attractive food.

Wingless viviparous females have been found in Montana upon the following plants: very common upon pigweed (*Chenopodium album* L.) and sugar beets; common on table beets, foxtail (*Hordeum jubatum* L.) and salt grass (*Distichlis spicata* Greene); occasionally upon blue-joint (*Agropyron occidentale* Scribn.) and dock (*Rumex crispus* L.); rarely upon wheat, flax, alfalfa, and horseweed (*Iva xanthifolia* Mutt.).

WINGED FALL MIGRANTS—SEXUPARA OF EUROPEAN WRITERS

From midsummer until late fall a part of the young which are produced by the wingless viviparous females develop wing pads and when full grown acquire wings and fly away. The conditions of the soil in regard to moisture has much to do with the number of winged lice that are produced. If the ground is kept moist or the rootlets of the host plant are succulent, few winged lice are produced, but if the soil becomes dry and the rootlets tough, the production of winged lice is greatly accelerated. In September and October when the beet fields generally become quite dry, the ground is sometimes almost black with the myriads of winged lice that have crawled up from the roots. Doane makes this statement:¹ "These winged individuals are the ones that provide for the distribution of the species, for after making their way to the surface of the ground, they sometimes fly for considerable distances. Having settled at the root of some plant, they soon begin to bring forth living young and thus a new colony, the winter colony, is established.

In Montana we have not observed this to be true. All of the many winged lice which we have confined in glass tubes have given birth to young which could not possibly start winter colonies. For several

¹Page 8, Bulletin No. 42, Washington Experiment Station.

years we were in doubt as to where these winged lice went. They could be seen to fly away from the beet fields, but their destination was a mystery. The native cottonwood (*Populus balsamifera* Linn.) was suspected of being the alternate host, but not until September, 1912, were our suspicions confirmed. The insects were first noticed on the edge of a weedy field where *P. betæ* had previously been noticed in abundance upon the roots of pigweed, foxtail and blue-joint. As one looked across the field the air above it swarmed with winged lice which were flying toward a row of cottonwoods on the edge of the field. This row consisted of trees in three stages of leaf ripening. Some had lost nearly all their leaves, on others the leaves were still a dark green, while one tree at the end of the row retained its leaves which were a light yellow in color. To this last tree the majority of the lice directed their flight. Alighting on the leaves they immediately started down the stems to the main branches and down the main branches to the trunk. Every branch was gray with an army of winged aphids all marching in one direction,—down the tree. When the main trunk was reached, the lice crawled down until a suitable crack or crevice was found into which they would crawl. Many continued to the ground and secreted themselves in the leaves, grass, and dirt around the base of the tree. A loose piece of bark pulled from near the base of the tree revealed a mass of the winged lice clustered beneath it. Some were already dead with the abdomen shrunken clear to the thorax. Crawling over the dead bodies were small yellow lice and other winged specimens were observed giving birth to these small yellow individuals. The swarming continued until dark and was repeated on a smaller scale on warm, still days throughout the fall. Upon microscopic examination the great majority of winged migrants proved to be *Pemphigus betæ*, although a few specimens of a much larger undetermined species were also observed.

Winged individuals have been collected from sugar beets, pigweed, foxtail and blue-joint.

TRUE SEXES—SEXUALES OF EUROPEAN WRITERS

An examination of the small yellow lice deposited by the fall migrants showed them to be the true sexes. The females are nearly twice the size of the males and each contains a single large egg which shows plainly through the body wall. Each fall migrant gives birth to from four to seven individuals, the majority of which are females. One was observed to give birth to seven young in forty minutes. Both sexes have rudimentary mouth parts and take no food, but nevertheless four molts are passed through. The time of molting varies in different individuals but in nearly every case is completed at the end of four days after birth.

sexual activity is not shown until the fourth molt after which the males crawl blindly about attempting to copulate with any female they can find. In from seven to twelve days after birth the female deposits a single, pale yellow egg and in a short time dies. Sometimes death occurs before the egg is extruded in which case the walls of the abdomen gradually shrink away finally leaving the egg exposed. Normally the female secretes a mass of bluish, white threads in which the egg rests after deposition.

Gillette has also reported finding the true sexes upon cottonwood in Colorado.¹

Eggs

Eggs deposited by the sexual females remain in the crevices of the bark until the following spring, without change. By April 15, many of the eggs were turning darker in color and showed the eyes and a dark spot in the abdomen of the embryo. Hatching was first observed out of doors at Bozeman, May 3. The shell split near the head and by contractions of the body the young louse slowly forced its way out of the shell.

STEM MOTHER—FUNDATRIX OF EUROPEAN WRITERS

The young lice hatching from the eggs crawl up the trees and cluster upon the expanding buds. As soon as the leaves unfold, feeding begins, generally on the upper side of the leaves in the angle between the mid-rib and the first or second vein. The resulting gall first starts as a depression at the point of attack, which gradually deepens and is finally closed from above by the growth of the leaf. The opening is a narrow slit or furrow parallel with the mid-rib or one of the large veins and scarcely noticeable from above. There is a high mortality among the immature stem-mothers. Out of thirty lice that were observed to start the formation of galls, only four lived to reach maturity.

Stem-mothers were first observed giving birth to young on the first day of June. The greatest number of young known to be borne by a single stem-mother was 172, while the average was about 75.

WINGED SUMMER MIGRANTS—FUNDATRIGENIA OF EUROPEAN WRITERS

All of the progeny of the stem-mothers developed wing pads and by June 20, some had acquired wings and were leaving the galls. By June 20, 90 per cent of the galls were deserted.

On July 3, a Pemphigus having all the structural characteristics of winged individuals in the galls was observed on the leaves of Chenopodium, giving birth to young. The young at birth were enveloped in a

¹Page 24, Twenty-fourth Annual Report of the Colorado Experiment Station.

membrane, but soon freed themselves and after wandering about on the leaf for a moment or two started down the leaf stalk and continued to the ground. This deposition of young upon *Chenopodium* was observed many times during the next two weeks and in every case the young lice proceeded directly to the ground.

On July 5, 250 plants of *Chenopodium album* were dug and their roots carefully examined for *Pemphigus betæ* colonies. Plants were examined on many parts of the college grounds, only one or two being dug in each locality. Sixty-five plants were found to be infested with colonies of *Pemphigus betæ* made up for the most part of very young lice. They were on fine rootlets that lay close to the surface of the ground and in most cases the ground was cracked so that they had easy access to the roots if they descended from the leaves. On August 5, a similar search was made and out of the same number of plants examined in the same localities, 151 colonies were found.

This, together with the fact that *Pemphigus betæ* seldom becomes abundant in the beetfields before the middle of July, has led us to believe that the principal source of infestation is the summer migrants, from the cottonwood galls.

Fifty migrants confined singly in glass tubes gave birth to a total of 480 young or 9.6 each. The greatest number produced by any one individual was 19. Young born to these migrants were placed upon sprouting sugar beet seed in germination cups; they began to feed immediately upon the fine rootlets. Others were placed upon the roots of the sugar beet plants growing in pots and in time developed into typical *Pemphigus betæ* colonies of wingless viviparous females. To avoid any chances of error, the roots of beet plants used in the experiments were dipped in "Black Leaf 40" and the soil used was carefully examined to see that it contained no root lice other than the young of the summer migrants.

The summer migrants, while resembling the fall migrants in general appearance, differ very materially in structure, a fact which seems to have been overlooked by most American workers in writing up other species in this group, but which has been especially noted by Tullgren, a Swedish writer.¹ The two principal differences in this species are in the number of sensoria on the antennæ and the absence or presence of wax glands on the thorax. In the fall migrants the arrangement of the larger sensoria is as follows: III 4-9; IV 2-3; V 0; VI 0. In the

¹ Aphidologische Studien Arkiv For Zoologi Band 5, No. 14.

The manuscript for this paper was submitted for publication November 8, 1913. In the December number of the *Annals of the Entomological Society of America*, volume 6, number 4, page 488, Professor C. P. Gillette has called attention to the marked difference which exists between the alate fundatrigenia and the alate sexupara of *Thecabius populimonilis* Riley.

summer migrant the arrangement is as follows: III 6-10; IV 2-3; V 2-5; VI 1-4. In the fall migrant paired wax glands are found upon the pro-, meso- and meta-notum, while in the summer migrants none are found upon any of the thoracic segments. According to the keys and descriptions of American writers these differences would surely place the fall and summer migrants in two distinct species and I believe that the summer migrant will prove to be an already described species, possibly *Pemphigus populicaudis* Fitch. Further study is needed before this point is decided.

SUMMARY

Wingless viviparous females are found in the ground the year around upon the roots of beets, weeds and grasses.

In the fall winged individuals are produced which fly to cottonwood trees and deposit the true sexes.

The sexes mate and the female deposits a single winter egg in the crevices of cottonwood bark.

The following spring the young louse hatching from the egg ascends the tree, forms a gall, in which a single generation of lice is produced, all of which are winged and become the summer migrants.

The summer migrants fly to beets, weeds, and grasses and upon the leaves of such plants give birth to young which descend to the roots and start new colonies of winged viviparous females.

THE SAN JOSÉ SCALE IN NOVA SCOTIA

By ROBERT MATHESON

Nova Scotia is the most easterly province of the Dominion of Canada, situated between 43° 30' and 47° north latitude. It is almost completely surrounded by water, being connected to the mainland by a narrow strip of land only twelve miles wide. It is also deeply cleft by many bays and harbors so that no place is more than a comparatively short distance from the coast. It has an area of 20,500 square miles, a considerable portion of which is not well suited to agriculture. The northwestern portion of the province lies in the transition zone while the remainder has been placed in the Canadian zone. I do not think this represents in all cases the true distribution of the faunal zones of the province but this is due to our lack of knowledge of the local fauna. The section from Windsor to Digby lying between the north and south mountains forms the main fruit section and is spoken of as the "fruit belt." Here apples, plums, cherries and pears are grown extensively while peaches and grapes do fairly well in certain sections though not grown commercially to any extent. Small fruits

are also grown and this branch of the fruit industry is gradually being developed with the increase of market facilities. Other sections of the province, particularly the numerous river valleys on the south and north, are well suited to the growing of apples, plums, cherries and small fruits. Fruit growing is being generously aided by the government through the establishment of numerous model orchards, scattered one or more in nearly every county outside the recognized fruit belt. Over thirty-five of these are now established and it is hoped that encouraging results may be obtained within the next few years.

Many, in fact most, of the orchards throughout the fruit belt, more commonly known as the Annapolis Valley, consist of large, thrifty trees which have been in bearing for many years. Lately through the stimulus of large crops and good prices extensive plantings have been made and it will not be long before the fruit crop will have doubled and trebled. The production of apples is usually over 1,000,000 barrels per year while in 1911 an exceptionally good year, over 1,500,000 barrels were exported. Many of the progressive fruit growers predict a 5,000,000 barrel export crop within the next five years. This fruit belt has always been free from some of the worst fruit pests and up to within the last two years it was claimed that the province was entirely free from San José scale. The discovery of this dangerous orchard pest by Mr. George E. Sanders in the spring of 1911 aroused widespread interest and misgivings as to the future of the fruit industry. Living scale was found on nursery stock planted the preceding year proving that this scale could survive the winters in Nova Scotia.

There has been considerable discussion as to the northern limit of San José scale. However, this dangerous fruit insect is gradually moving northward, particularly in Ontario and New York, where it is now working slowly into the transition zone. Professor Caesar, provincial entomologist of Ontario, informs me that it has not yet become established in Ontario beyond the northern limit of the upper austral zone as laid down by C. H. Merriam, and he thinks it will not thrive beyond this. The fruit belt in Nova Scotia is at present entirely in the transition zone but further faunal studies may change this and I think it will. For the past nine years the average of the minimum temperatures for the most northerly point of this fruit belt (Windsor) is -11.5° while the lowest temperature during the same time is -18° . The average maximum temperature for the same period is 90.5° , the highest temperature being 96° . A few miles further west at Wolfville, N. S., the average minimum temperature covering a period of eight years is -9.2° , the lowest being -14° . The average maximum temperature is about the same as for Windsor.

In Nova Scotia the scale has survived the winters but at present there

is no data regarding the winter mortality. Experiments have been started at Truro, N. S., on the effects of climatic conditions on this scale but no results are as yet available. During the past summer scale-infested trees were under constant observation and the number of generations up to the first of October was carefully observed. The first adult male was taken in our outdoor breeding cage, which consisted of four partially infested young apple trees enclosed in wire netting so as to prevent distribution, on June 23. The spring was cold and backward but the female scales were growing rapidly and many male pupae were ready to transform. On July 26 the first living young were observed and within the next ten days many of the young lice could be seen crawling over the trees and settling down. The weather during the latter part of June was very cold, a severe frost on the 22d having destroyed many tender plants and here and there young potato plants. The first generation were hatching in abundance about August 7. The trees were now becoming well covered with the maturing scales. On August 22 we had another sharp frost killing such plants as tomatoes, squash, cucumber, corn, and in some places blackening fields of maturing potatoes. However, the scale seemed to thrive and the second generation began moving about September 3 and continued abundantly for the next four weeks. On October 12 young lice were still hatching but whether this was the last of the second generation or beginning of the third I could not determine. However, the season of 1913 was an exceptionally cool and backward one in Nova Scotia, a similar one not having been experienced for many years previously. The spring was late and cold while severe frosts occurred late in June and rather early in August, a condition seldom occurring. Yet despite this there were two full generations of the San José scale and I feel that under normal conditions there will always be at least a partial third generation. As to whether the majority of the scale will winter or not is yet to be learned. The minimum temperature at Truro, N. S., rarely goes to -25° F. though during the winter of 1912-1913 the lowest recorded was -27° F.

Following the discovery of living San José scale, active measures were at once taken by M. Cumming, Secretary for Agriculture. Fortunately an insect pest law, drawn in broad terms, had been enacted in 1901 and under its provisions a thorough inspection of all nursery stock imported during the years 1910, 1911 and 1912 was begun. Lists of consignees were obtained from nearly all the nursery firms that had one business in the province. These lists furnished a basis for the work. Mr. George E. Sanders, of the Dominion Entomological Station, took charge of the work and pushed it energetically. The results of this work are shown in the following pages.

It is not the purpose of this paper to outline the regulations that have since been passed governing the admission of nursery stock into the province. Suffice it to say they are quite adequate to keep out all infested stock if properly enforced. During the spring of 1913 the

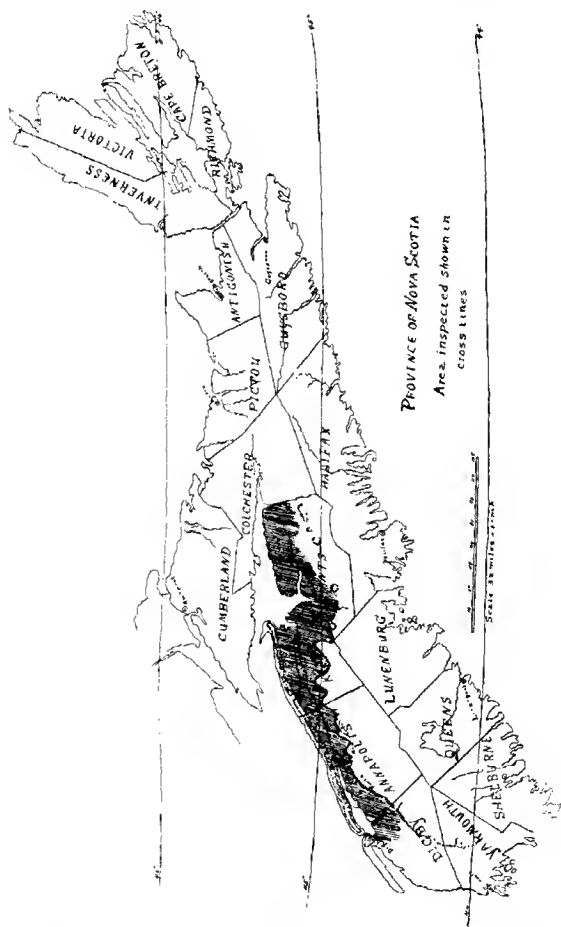


FIG. 5. Map of Nova Scotia showing inspected areas.

writer determined to inaugurate a thorough inspection of the entire fruit belt. It was determined to pursue the policy of the preceding year,—to destroy all infested trees and if possible to exterminate the scale. I feel the results have justified the expenditure and it would

stem that it is now possible to completely eradicate this pest or keep it so in check that there will be no danger of the old orchards becoming infested. The plan pursued was to have inspectors visit every farmhouse and garden throughout the district shown in cross lines on the map in Fig. 9. This actual field work was in charge of Mr. H. G. Payne and under him were eight competent inspectors. The inspectors worked in pairs and every inch of ground was carefully gone over. They were required to give information on the following points, the accuracy of these answers depending largely on the ability of the inspectors:

Name, address, origin of stock; trees destroyed, 1910, 1911, 1912, 1913; number inspected; acres in orchard; spraying, cultivation, and condition and general remarks.

As they knew the country thoroughly and were all acquainted with local conditions the results may be considered as fairly accurate. We found the people only too willing to aid us, and no particular difficulty in securing the information required was met with.

RESULTS OF THE INSPECTION WORK

	1912	1913
Number of properties inspected.....	1,758	5,042
Number of trees inspected..... (estimate)	150,000	166,000 (actual count)
Number of properties infested (including dead scale)...	793	123
Number of trees of 1910 planting destroyed.....	7	0
Number of trees of 1911 planting destroyed.....	339	6
Number of trees of 1912 planting destroyed.....	377	15
Number of trees of 1913 planting destroyed.....	—	6
Total number of trees destroyed.....	723	56

A comparison of the results of the two seasons' work shows gratifying results especially when one considers that during 1913 a much larger area was inspected and many more trees were carefully gone over. This also included the entire 1913 planting. The results of another year's work may actually demonstrate the practical eradication of San José scale from this restricted fruit belt.

In order to secure data for future recommendations I had the inspectors obtain as accurate answers to the other questions as possible. As I know of no other similar survey of a district which has been producing fruit for over 100 years I here offer these results which may prove of interest to many entomologists.

Total number of properties inspected.....	5,042
Total acreage (approximate) in orchards.....	31,205
Number of fruit growers who spray at least once (we did not request the number of sprayings).....	2,378

Number of fruit growers who do <i>not</i> spray.....	2,664
Percentage of fruit growers who spray.....	47.3
Acreage of orchards sprayed at least once.....	23,311
Acreage of orchards <i>not</i> sprayed.....	7,895
Percentage of orchard area sprayed.....	74.7

This data is for the whole district shown in cross lines in Fig. 9. It may further be remarked that the inspectors were careful in securing acreage and all areas down to one eighth or one sixteenth or even smaller fractions of an acre were included. Furthermore, all the men had had careful training in estimating areas so that the results may be taken as fairly accurate, much more so than the best of census returns. In regard to the results as to spraying our men had to be careful in questioning property owners as there had been considerable agitation for an out and out compulsory spray law, compelling every one to spray according to a more or less fixed schedule. The inspectors took careful note of the condition of the trees and also looked around carefully for signs of spray outfits or spray materials before venturing to inquire too closely,—so these results may be looked upon as accurate as can be obtained.

Further, this fruit belt is divided into counties as shown on the accompanying map. Kings County has always proclaimed itself as the most up-to-date fruit section, so with considerable clerical labor I had the results tabulated as to counties and this will undoubtedly prove of interest as showing what may be done by progressive fruit growers in a particular district or county.

Counties	Hants	Kings	Annapolis	Dorset
Number of trees inspected.....	10,704	102,195	52,117	818
Number of trees destroyed.....	15	36	5	0
Number of properties inspected.....	532	2,735	1,631	144
Number of fruit growers who spray.....	117	1,729	525	7
Number of fruit growers who do <i>not</i> spray.....	415	1,006	1,106	137
Percentage that spray.....	21.9	63.1	32.2	4.8
Total acreage in orchards.....	2,372	20,435	8,118	281
Acreage sprayed at least once.....	1,015	17,652½	4,601	41½
Acreage <i>not</i> sprayed at all.....	1,357	2,782½	3,517	239½
Percentage sprayed.....	43	86½	56½	14½

In examining these tables one must not forget that the number of trees inspected only covers those trees planted in 1910, 1911, 1912, and 1913. It will readily be seen from consulting and comparing these tables that it is the smaller orchardists that usually do not spray, though this is by no means always the case. These small orchards scattered all over the district furnish ideal breeding grounds and centers for dispersal of injurious insects or fungous diseases. There has been considerable agitation for a general compulsory spray law but whether it would work out successfully in such a district is rather

doubtful as at present there are a goodly number of people who are opposed to spraying in any form.

A NATURAL ENEMY OF THE ARGENTINE ANT

By WILMON NEWELL, College Station, Texas

The phenomenal abundance of *Iridomyrmex humilis* in the southern parts of Louisiana and Mississippi is doubtless explained by the absence of both parasites and predaceous enemies. During the ten years in which this ant has been under almost constant observation no enemies of importance have been observed until recently.

During September last Mr. R. S. Moore, an extensive orange grower in the Louisiana citrus-growing section, sent to the writer specimens of an ant which he had found very active in raiding the colonies of *Iridomyrmex humilis*, destroying adults and carrying off the larvæ and pupæ of the latter. The specimens were thought to be one of the legionary ants, *Eciton* (*Acamatus*) *schmitti* Emery, and this was subsequently confirmed by Dr. W. M. Wheeler upon examination of specimens.

Mr. Moore is, fortunately, a very close observer and is not without considerable reputation locally on account of his intimate knowledge of all the common injurious insects of the orange groves. During the past year Mr. Moore has frequently observed the *Ecitons* in their foraging expeditions and gives a graphic account of the thorough manner in which their pillaging colonies destroy practically all the individuals of *I. humilis* in the territory which they raid. In fact, in some of the orange groves which were formerly threatened with complete destruction on account of the great abundance and activities of *humilis*, and which have been favored with several visits of the *Ecitons*, hardly a specimen of the former species can now be found.

The territory in which the *Ecitons* have thus been active is upon the west bank of the Mississippi River below New Orleans, where the only arable land is a narrow strip just within the levee. The entire territory is practically surrounded by water, the river being on the east side and a constant succession of swamps and bayous occurring on the west from opposite New Orleans to Barataria Bay on the Gulf of Mexico. It seems hardly probable that the migratory *Ecitons* will be able to leave this area on account of the water barriers. One is, at the same time, forced to the conclusion that the species has been established here for many years past and that it is increasing in numbers on account of the great abundance of the Argentine ant. It is also interesting to note that this, the first important enemy of the Argentine ant to be discovered, is a native form operating against an introduced species belonging to the same family as itself.

A NEW COTTON SCALE FROM PANAMA

By T. D. A. COCKERELL

A few weeks ago Mr. E. Bethel of Denver kindly forwarded to me some Coccidae collected in the Panama Canal Zone by Mr. James Zetek. One of the species was seen at once to be a new *Icerya*; and as this genus is of more than ordinary interest, both from the economic and purely scientific points of view, the insect is described herewith.

Icerya zeteki n. sp.

On stems of an undetermined plant, having dark red color externally and much white pith within.

Female.—Oval, about $4\frac{1}{2}$ mm. long, densely covered with white cottony tufts slightly stained with yellow; an elongated central mass of white wax is surrounded by a channel or depression, except anteriorly, and this is margined by a series of low quadrate tufts, about seven on each side, separated from each other only by slight depressions; outside of these, not separated by any interval, are low subquadrate tufts, about 10 on each side; in front is a suberect, horn-like but truncate, waxy projection, one mm. or more long; while posteriorly a similar waxy projection, but much longer (up to 4 mm.) projects over the ovisac, from which it is quite free. Ovisac $3-3\frac{1}{2}$ mm. long, very strongly fluted, white suffused with pink. No glassy filaments. Legs and antennae piceous. The measurements of legs and antennae are in microns. Anterior legs: femur with trochanter, 640; tibia 512; tarsus with claw 272. Antennae 11-jointed, third joint longer than broad, fourth broader than long. Joints measuring (1.) 80 (2.) 96, (3.) 104, (4.) 72, (5.) 64, (6 to 10) each 80, (11.) 160.

Larva light raspberry color; antennae 6-jointed, the joints measuring (1 to 5) each about 50, (6.) 160; last joint or club with no swelling at base; longest bristles on antennae about $830\ \mu$; three pairs of long straight bristles on each side of caudal end, the longest $1360\ \mu$ long (the body of the larva being only about 750); anterior to these are two very long curled bristles, then three shorter curled ones, then much shorter straight ones.

Closely allied to *Icerya brasiliensis* Hempel, but with the anterior and posterior waxy processes shorter, and wholly without the lateral posterior processes, on each side of the long one, which are so conspicuous in *I. brasiliensis*. In the larva of *brasiliensis* the posterior curled bristles of abdomen are not longer than the anterior ones. The ovisac of *brasiliensis* is creamy white, not pinkish.

ACAROLETES PSEUDOCOCCI n. sp.

By E. P. FELT, Albany, N. Y.

This interesting midge was reared in 1913 by Prof. H. J. Quayle from *Pseudococcus citri* Risso collected by him in Sicily. It is tentatively referred to the above named genus though it seems to have no very close affinities with *A. tetranychi* Kieff., the generic type. We are

unable to refer it to any described species, and the form is therefore characterized as new.

Male. Length 1.5 mm. Antennae probably as long as the body, sparsely haired dark brown; 14 segments, the fifth with the stems, each with a length about twice the diameter; terminal segment missing. Palpi; first and second segments short, irregular, the third with a length about four times its diameter, the fourth $\frac{1}{2}$ longer than the third, the distal two thirds dilated. Mesonotum yellowish brown. Scutellum, post-scutellum and abdomen fuscous yellowish. Halteres yellowish basally, fuscous apically. Coxae and femora basally yellowish, the distal portion of femora, tibiae and presumably tarsi, fuscous straw. Genitalia; basal clasp segment rather long, moderately stout and internally at the basal angle with a long, narrowly triangular lobe, the latter slightly curved apically; terminal clasp segment moderately long, slender; dorsal plate short, triangular, emarginate, the lobes broadly rounded; ventral plate short, broad, narrowly and irregularly rounded; style short, tapering to a narrowly rounded apex.

Female. Length 1.5 mm. Antennae extending to the third abdominal segment, sparsely haired, fuscous yellowish; 14 segments, the fifth with a stem $\frac{1}{2}$ the length of the cylindric basal enlargement, which latter has a length $2\frac{1}{2}$ times its diameter; terminal segment slightly produced, with a short, stout process apically. Palpi practically as in the male, except that the third and fourth segments appear to be nearly equal. Mesonotum purplish brown. Scutellum and post-scutellum yellowish brown; abdomen sparsely haired, deep red. Halteres yellowish basally, fuscous apically. Coxae and femora basally yellowish, distal portion of femora, tibiae and presumably tarsi, fuscous straw. Claws stout, strongly curved, bidentate, the pulvilli as long as the claws. Ovipositor short, obtuse, the terminal lobes narrowly oval and sparsely setose. Type Cecid a2469.

This species presents a close general resemblance, both in antennal and alar characters, to *Arthrocnodax* from which it is most easily separated by the bidentate claws. The internal lobe of the basal clasp segment suggests a relationship to *Coquillettomyia* Felt, though there is no marked chitinization of the ventral plate or harpes so pronounced in this genus.

AMMONIA GAS AS A FUMIGANT

By D. E. FINE, Assistant, Truck Crop and Stored Product Insect Investigations, Bureau of Entomology.

Ammonia has never been the subject of experiment as a fumigant so far as the writer can learn, at least in recent years. It first suggested possibilities in this direction when through accident the fumes were inhaled. Its properties as a disinfectant add to its value, particularly when used on food products.

While the sources of ammonia are many, at the time the experiments were begun only one source was found available, viz., the "concentrated ammonia" obtained in drug stores, and said to contain 27 per cent of ammonia in solution. It is readily seen that in the use of this form it is necessary to handle practically three parts of water every time one part of ammonia gas is desired.

EXPERIMENT 1

July 1, 1913, six quart bags containing cow peas previously sifted of all dead weevils and having only live weevils present were placed in a fumigation box of $8\frac{3}{4}$ cubic feet capacity. Two ounces of concentrated ammonia were used.

July 2, the results were as follows:

	Dead	Alive	Per cent Killed
1	57	6	90
2	85	16	84
3	96	33	74
4	66	9	88
5	9	7	56
6	81	39	67

EXPERIMENT 2.

July 2, 1913, six quart bags of cow peas containing living weevils as in the previous experiment were subjected to 3 ounces of concentrated ammonia in the same fumigating box.

July 3, the results were as follows:

	Dead	Alive	Per cent Killed
1	42	0	100
2	61	0	100
3	71	1	99
4	64	0	100
5	52	0	100
6	25	0	100

Further experiments were undertaken with a 50-pound bag of cow peas which, with 3 ounces of the concentrated ammonia and an exposure of 48 hours, gave from 75 to 85 per cent of weevils killed.

Experiments were tried with a 100-pound bag, the amount of concentrated ammonia being increased to 1 ounce to the cubic foot, but even this amount failed to give a high mortality. Further experiments with ammonia are under way to ascertain its value as a fumigant against household insects and stored product insects on a large scale.

A NEW SPECIES OF KERMES FROM CONNECTICUT

By GEO. B. KING, *Lawrence, Mass.*

Kermes waldeni, n. sp. Adult female scale: Globular, 5 mm. in diameter, shiny. Surface, yellowish brown, with four transverse very dark brown bands on the meson, and marbled with brown somewhat darker than the general surface color. Some of the marblings are circular. The surface is also marked with some dark brown spots.

and some specimens show a few small pits. The coloring and markings are extremely variable, more so than in any other species yet described.

The individuals of this species show a marked tendency to cluster around the forks of the twigs, whereas those of most other species found in Connecticut occur sparingly or singly.

On *Quercus* sp. Portland, Conn., August 12, 1913, collected by Mr. B. H. Walden after whom I take pleasure in naming the species.

In preparing a work on the genus *Kermes* in order to give exact geographical distribution, I have written to entomologists in every state from which *Kermes* has been recorded. The first response came from Dr. W. E. Britton of New Haven, Conn., who sent me all the material in the collection of the Agricultural Experiment Station. This material contained the species described above, as well as other species which I have identified as follows:—

Kermes pubescens Bogue, on *Quercus* sp., New Haven, Conn., August 20, 1908, H. L. Viereck; June 27, 1913, W. E. Britton.

Kermes kingii Ckll., on *Quercus* sp., New Haven, Conn., August 20, 1908, H. L. Viereck; August 26, 1913, Q. S. Lowry, November 11, 1913, B. H. Walden.

Kermes sassceri King. MS., on *Quercus* sp., Putnam, Conn., April 17, 1906, B. H. Walden; New Haven, Conn., July 26, 1906, October 12, 1908, November 11, 1913, B. H. Walden; August 26, 1913, Q. S. Lowry; Meriden, Conn., August 27, 1913, Harry Johnson.

CANADA PROHIBITS IMPORTATION OF NURSERY STOCK THROUGH THE MAILS

By an Order-in-Council of December the 4th, 1913, the following amendments to the Regulations under The Destructive Insect and Pest Act were passed:

In Regulation 3, line 14, the words "Importations by mail shall be subject to the same Regulations" were struck out and the following new Regulation, No. 18, has been passed:

"18. The importation of all nursery stock, including trees, shrubs, plants, vines, cuttings, scions, cuttings or buds through the mails is prohibited, excepting green-house plants, cut flowers, herbaceous perennials, and bedding plants, which may be admitted provided that a detailed statement of the contents is attached to each parcel."

This Regulation is to take effect on and after the first day of March, 1914.

C. GORDON HEWITT,
Dominion Entomologist.

Scientific Notes

Concerning Remedies for Chiggers. While in conversation with the late E. F. Erwin, of the Department of Agriculture, concerning remedies for "chiggers" (*Trombidium* spp.) the writer mentioned the value of cattle and even of the passing of many persons in destroying the pests by trampling them. This is printed in the last paragraph of Circular 77, of the Bureau of Entomology, page 66, but where the subject is considered from the standpoint of infestation to a limited tract.

Mr. Erwin stated that when we have to deal with a badly chigger-infested tract of, say 400 acres, he considered cattle inadequate and cited his own experience on such a tract, that after turning sheep into the field that the chiggers were destroyed. Undoubtedly this was largely due to their being trampled to death, and to the sheep keeping the grass more tightly cut than would cattle, but Mr. Erwin also believed that the chiggers ascend the limbs of the sheep and that the oil in the wool is responsible for their demise.

Whatever may be the truth, it is obvious that sheep turned into large tracts of infested land would probably accomplish the eradication of the mites more thoroughly and in a shorter space of time than would perhaps any other domestic animals that might be employed for the purpose with the possible exception of goats.

F. H. CHITTENDEN, Sc.D.,

Bureau of Entomology, U. S. Department of Agriculture.

The Colorado Potato Beetle Migrating to the Pacific Coast. Early writers on the distribution of the Colorado potato beetle (*Leptinotarsa decemlineata* Say) were of the opinion that this species would not be able to become disseminated westward of Colorado. In later years we have found that many species become distributed from west to east as well as from east to west. In other words, we cannot lay down "hard and fast rules" in regard to a great many forms of insects. This matter was summed up by the writer in 1907.¹ "As was predicted years ago, the Rocky Mountains have proved an impassable barrier for this species, and the insect had not been able to reach the Pacific Coast or neighboring states west of such barrier." It was, therefore, a considerable surprise to receive specimens of this beetle in somewhat cramped condition, owing to their being tightly pressed, with larvae, into a small tin box. The beetles show no particular difference from the typical *L. decemlineata*.

It seems more than probable that this species has made its way so far westward through the agency of man or by what Doctor Howard has termed a "commercial jump," and it may now be expected anywhere west of the Rocky Mountains, since we know of its occurrence in Colorado 8,000 or more feet above sea-level. The specimens were obtained from Sister M. Rose, Order of St. Benedict, Colton, Washington, who kindly furnished them by request.

F. H. CHITTENDEN.

On a Food-habit of *Alabama argillacea*. Mr. Charles Alkire, an orchardist at Keyser, Mineral County, W. Va., reports that the moths of *Alabama argillacea* did serious damage to late peaches in his orchard in the fall of 1911 and again in 1912. He states that the moths punctured the skin of the ripe fruit and fed on the juice, the puncture being very small and not noticeable until the bloom or fuzz was rubbed from the skin. The injured fruit would be normal in appearance until picked, when it would be found to have soft spots about an inch in diameter surrounding the punctures. These rendered it unfit for packing and shipping and even for local use.

¹ Circular No. 87, Bureau of Entomology.

The varieties injured were late clings and the extent of the injury was as great as 75 per cent. Only comparatively few trees were affected for the reason that not many of the late varieties were in bearing at that time. There appears to be no doubt as to the responsibility of the moth in question as Mr. Alkire states that he, personally, has observed the moth at work and that several of his workmen have also seen it. He submitted samples of the moths, so there is no doubt as to the identity of the species.

Spilogale feeding upon Peach-tree borer pupæ. Mr. Alkire also called attention to the value of the common pole-cat (*Spilogale interruptans*) as an insect destroyer. He states that in worming peach trees, especially in August, he has repeatedly found traces of this animal and has seen where it had removed the pupæ of the peach-tree borer from the soil, and that one afternoon he, with several workmen, was worming trees and saw the pole-cat going from tree to tree and searching for the pupæ which it dug out and devoured.

L. M. PEAIRS, Morgantown, W. Va.

Occurrence of the Argentine Ant in Texas. On January 3, 1914, the writer visited Beaumont, Texas, and found a heavy infestation by *Iridomyrmex humilis* Mayr. throughout a considerable portion of the business and residential sections of the city. The evidence of citizens interviewed indicates that the insect has been established in this locality for the past five years and the infestation is fully as heavy as at points in Louisiana and Mississippi which have been infested for a similar period.

The occurrence of the ant at this point, on the main line of the Southern Pacific Railway, confirms previous observations to the effect that most rapid dissemination takes place along the lines of heavy railway traffic.

WILMON NEWELL.

Galveston Station, Texas.
January 7, 1914.

JOURNAL OF ECONOMIC ENTOMOLOGY

OFFICIAL ORGAN AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS

FEBRUARY, 1914

The editors will thankfully receive news items and other matter likely to be of interest to subscribers. Papers will be published, so far as possible, in the order of reception. All extended contributions, at least, should be in the hands of the editor the first of the month preceding publication. Contributors are requested to supply electrotypes for the larger illustrations so far as possible. The receipt of all papers will be acknowledged.—Eds.

Separates or reprints will be supplied authors at the following rates:					
Number of pages	4	8	12	16	32
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Some contributors fail to realize the importance of sending in papers promptly after the annual meeting or the need of returning proof without loss of time. These hindrances have made it impossible for the editor to get out this number on time.

Those who were able to attend the Atlanta meeting found a most interesting program and a larger attendance than many had anticipated. The papers covered a wide range of subjects and contained much that was suggestive. A notable contribution was the account of the large scale control of grasshoppers in a western state as a result of using the resources science has placed at the disposition of man. It was a problem in organization and coöperation as well as one depending upon exact knowledge of methods. Those who engaged in this practical effort, a game in which the resources of man, were pitted against the multitudes of nature are to be congratulated upon winning a fight which only a few years ago would have been considered nearly hopeless. It was a most creditable triumph of modern science.

Committee reports are ordinarily disposed of in a few moments and, in many instances, we fear, ignored thereafter. This should not be the fate of the report of the committee on the Efficiency of Entomological Publications. The members have spent considerable time upon the matter and though the nature of the problem was such that definite conclusions are almost impossible, the data gathered is most suggestive and might well be subjected to further test by every member of the association as opportunity offers. The popular bulletin, elementary in nature from the entomologist's viewpoint, is the one most generally valued, particularly if comprehensive and well illustrated. It is quite possible that further consideration of the question will result in more popular bulletins being widely distributed and a more fully limited circulation of the more special or technical publications.

The latter are the important issues from the scientific standpoint and must ever form the basis of any satisfactory progress. Research work must be available though not necessarily in the hands of everyone. Adjustments in dissemination may be advisable as well as in presentation.

Obituary

EDWIN ALONZO POPENOE

PROFESSOR EDWIN ALONZO POPENOE, A. M., for many years professor of entomology in the Kansas State Agricultural College at Manhattan, and entomologist of the Station, died in November, 1913.

Professor Popenoe was born July 1, 1855. He was the first professor of entomology at the Kansas Agricultural College and was made entomologist with the establishment of the Station by the Hatch Act in 1887. For several years the chairs in entomology and horticulture were combined, but later were separated and Professor Popenoe was continued as Professor of Entomology. He was a man of quiet and retiring disposition, a great reader, and well posted on many subjects, and was loved by his students and friends.

When he retired from active teaching, about six years ago, he purchased a fine farm five miles south of Topeka where he raised many flowers, specializing in iris and peonies.

Professor Popenoe married Miss Flora Hyde who died in the eighties. He afterwards married Carrie Holcomb, who with four sons, survive him. Charles H., is in the Bureau of Entomology, Division of Truck Crops and Stored Product Investigations; Hubert teaches agriculture in a Minnesota school; Edwin A., Jr., manages the home farm; Willis P. is still a boy in school.

Professor Popenoe was for many years a member of this Association. His death was said to be due to a clot of blood at the base of the brain, the result of overstraining.

W. E. B.

ALFRED GOTTLIEB HAMMAR

MERED G. HAMMAR, entomological assistant of the Bureau of Entomology of the United States Department of Agriculture, was accidentally shot and instantly killed, while on a hunting trip near Roswell, N. M., October 15, 1913.

Mr. Hammar was born May 19, 1880, at Bromstad, Sweden. As a boy he was much interested in natural history and at the age of sixteen, full of desire to study first-hand the tropical fauna of which

he had read marvelous accounts, he went to Brazil. There he obtained employment in a drug store in the state of Sao Paulo and immediately improved his opportunity to study not only the zoology, but also the botany of the region. He quickly attracted the attention of prominent scientific workers and, before long, secured a position with the *Commissao Geografica e Geologica* of Sao Paulo, in the division of botany and meteorology. He also accompanied a German scientific expedition on an exploring trip through parts of Brazil.

His interests had always been along entomological lines and he showed so much promise that his chief, Orville A. Derby, advised him to go to Cornell to study with Professor Comstock. This he did arriving at Ithaca in the spring of 1903.

Though Mr. Hammar was handicapped by the facts that he knew practically no English and that he was wholly self-supporting, his ability and zeal were such that he completed his course with honor in the minimum period and graduated with the class of 1907, taking the B. S. A. degree. He was then appointed assistant in entomology at Cornell, and, carrying on his graduate work in the summer of 1907 and the following year, received the degree of Master of Arts in 1908.

In the spring of 1908 he secured a position as special field agent with the Government Bureau of Entomology and very soon was regarded as one of the most reliable and promising of the young men in the service. He was given assignments of increasing responsibility and on April 1, 1913, was advanced to the rank of entomological assistant. From March, 1912, until the time of his death he was in charge of an important substation maintained in New Mexico.

He had been married, only two months before his death, to Miss Marion Horner of Parkersburg, W. Va. He and his bride were to have left in a few days to visit her parents in West Virginia and from there they were to sail for Sweden, his boyhood home.

Mr. Hammar was by no means a narrow specialist but was broadly trained and interested. He was a skilled artist, and used readily seven different languages. While at Cornell he was prominent in student activities. He was one of the organizers and leading spirit of the Cosmopolitan Club and editor of the first *Cosmopolitan Annual*. He was also active in the organization of the Agassiz Club, a member of Sigma Xi and of the graduate scientific fraternity, Gamma Alpha.

His career as a student afforded a clue to the traits which were of such an aid to him in all of his subsequent work, and which promised to put him very early in the front ranks of entomological workers. Well trained, keen and thorough, he possessed in addition, the personal traits which won the esteem and confidence of all with whom he came in contact.

This last characteristic is nowhere better shown than in the history of his work in New Mexico. As stated by those on the ground, "Hundreds of thousands of dollars had been invested in apple orchards in Chaves County which, originally free from all sorts of common pests, contained every element of promise to become the greatest deciduous fruit section in irrigated America."

The pests did not neglect their opportunity, but it is easy to understand that this young man, sent to investigate pests whose existence was not openly acknowledged, was coldly received. The imputation behind his detailment was resented and few there were who saw the great importance of the work which he took up. Such a condition demanded more than technical knowledge—it called for tact and a winning personality that are not easily found. As to how fully Mr. Hammar measured up to the situation, let the following quotations from a memorial by the Roswell Commercial Club speak:

"It was not until the spring of 1913, the present year, that the growers began to realize that they had such an asset in the Bureau of Entomology and Professor Hammar. The calls upon his time were numberless and he visited and advised in hundreds of orchards. Usually his advice was carefully followed and, wherever it was, the benefit to the trees and the fruit was positive and immediate."

"This Club, making an average from the estimates of the various growers, marketing associations, and exchanges, estimates the value of Professor Hammar's services to the county of Chaves, alone, this year to have been not less than a quarter of a million dollars. This relates solely to the increased quantity and improved value of the fruit, and in no sense to the value of the imparted knowledge, improved condition of the trees, etc., which can scarcely be estimated."

Such was the man who has gone out from us. He was an entomological expert, but he was more. Wherever he went he was beloved and to the many who knew him, his death is felt as a personal loss. It is worth while for an entomologist to have won from a community of energetic, hustling business men the closing paragraph of the letter above quoted:

"We will only say that our knowledge of Mr. Hammar was such as to impel the belief that constant contact with the heart of nature breeds a sublimity and yet a sweet simplicity of character that ennobles the process of government and inspires a wholesome reverence for the works of God and his natural laws."

WM. A. RILEY

Current Notes

Conducted by the Associate Editor

Colonel W. C. Gorgas has been appointed by President Wilson, surgeon-in-chief of the United States Army.

Dr. C. Gordon Hewitt, Dominion Entomologist of Canada, has been elected corresponding member of the Zoölogical Society of London.

Mr. C. H. Richardson is assistant in entomology at the Agricultural Experiment Station, New Brunswick, N. J.

Mr. G. H. Hollister, superintendent of Keney Park, Hartford, Conn., was recently elected pomologist of the Connecticut Horticultural Society.

Mr. W. O. Hollister, formerly entomologist of Parke Davis & Co., Detroit, Mich., is now connected with the Davey Institute of Tree Surgery, Kent, Ohio.

J. Robert Parker, assistant entomologist at the Montana Station, made a short visit at his home in Windsor, Conn., and at Amherst, Mass., during November.

Mr. A. J. Spangler, formerly assistant at the University of Kansas, now holds a similar position on the staff of the state entomologist, St. Anthony Park, Minn.

Mr. A. B. Gahan, M. S., formerly associate entomologist of the Maryland Agricultural Experiment Station, is now connected with the Bureau of Entomology, Washington, D. C.

Mr. Everett H. Cooper, who graduated in the class of 1913, Massachusetts Agricultural College, is teaching entomology at the College of Agriculture and Mechanic Arts, at Raleigh, N. C.

Prof. A. L. Quaintance of the Bureau of Entomology read a paper on "Insects Injurious to Nuts," at the meeting of the Northern Nut Growers' Association held at Washington, D. C., in November.

Mr. R. L. Fiske, a graduate of the Massachusetts Agricultural College, class of 1910, is now an inspector in the Department of Entomology of the Insular Government, Porto Rico.

Mr. J. A. Dew, formerly assistant in entomology at the Agricultural Experiment Station at Auburn, Ala., is now manager of the insecticide department of Van Antwerp's seed store, Mobile, Ala.

Doctor E. P. Felt gave the annual public address before the Entomological Society of America at Atlanta, Ga., Wednesday evening, December 31, on the subject of "Gall Insects."

Mr. George W. Peckham, author of several publications on solitary wasps and spiders, died at his home in Milwaukee, Wis., January 11, after a brief illness, at 168 years.

On November 28, 1913, Dr. W. J. Holland was elected an honorary member of the Royal Spanish Society of Natural Science, to fill the vacancy caused by the death of Lord Avebury.

President-Elect Theodore Wirth, of the Society of American Florists and Ornamental Horticulturists, has appointed Dr. W. E. Britton, New Haven, Conn., entomologist of the society for the year, 1914.

According to *Science*, Prof. F. V. Theobald, vice-principal and zoologist of the Southeastern Agricultural College at Wye, Eng., has been awarded the Mary Kingsley medal of the Liverpool School of Tropical Medicine.

Mr. Frederick Maskew, chief deputy quarantine officer of California, has been sent to the Hawaiian Islands by the Federal Horticultural Board to study the Mediterranean fruit-fly situation there.

At Oberlin College Robert A. Budington has been promoted to a professorship, and Dr. S. P. Nichols to an assistant professorship in zoölogy. Dr. Charles G. Rodgers has also been newly appointed professor of zoölogy in the institution.

Messrs. C. L. Marlatt, W. D. Hunter, W. A. Orton, E. R. Sasser, and Perley Spaulding, attended the section meeting of horticultural inspectors at Atlanta, Ga., January 1, 1914, as representatives of the Federal Horticultural Board.

The new biological building at Yale University is now completed. It houses the botanical and zoölogical departments, including entomology. It is a large and well appointed fireproof building of brown-stone.

Mr. Ralph W. Howe, a graduate of the Massachusetts Agricultural College, class of 1913, is now entomological assistant at Delta Laboratory, Tallulah, La., and is engaged in studying the cottonboll weevil.

Prof. A. L. Melander of the Washington College and Station, who is studying this year at Harvard University, lectured before the Brown University Chapter of Sigma Xi at Providence, R. I., November 24 on "The Control of Insect Pests."

It has been reported that the Federal Horticultural Board has asked Congress to appropriate \$35,000.00 with which to prevent the Mediterranean fruit fly from becoming established in the United States.

The following were elected officers of the Washington Entomological Society at the annual meeting December 4, 1913: President, Dr. W. D. Hunter; first vice-president, A. N. Caudell; second vice-president, E. R. Sasser; editor, W. D. Hunter; corresponding secretary-treasurer, S. A. Rohwer; additional members, of the executive committee, Dr. L. O. Howard, E. A. Schwarz, August Busek.

Colonel W. C. Gorgas, has been elected an honorary fellow of the Royal Sanitary Institute, London. Colonel Gorgas is chief sanitary officer of the Panama Canal Zone and recently investigated the sanitary conditions of the port of Guayaquil, with the result that that city is to be cleaned and a proper sanitary system installed, at an approximate cost of \$10,000,000.

Hugh Glasgow, Ph. D. (University of Illinois) has accepted an appointment as associate entomologist at the Geneva (N. Y.) Agricultural Experiment Station, in place of W. J. Schoene, resigned. He will devote his attention principally to the winged spring insects attacking tree fruits, and to a study of the effects of insecticides on plant tissues.

In a note in *Science*, we learn that an address on "Collecting Insects in the Obereiche Swamp" was given on December 2, 1913, before the New York Entomological Society by Prof. J. Chester Bradley of Cornell University, who was one of a

party to make biological explorations in this swamp in 1912, and who, in company with Prof. J. G. Needham, again visited the place in the summer of 1913. Oklawaha Swamp is situated in southeastern Georgia.

According to *Science*, "Capt. J. E. Siler of the Medical Corps of the United States Army and Mr. A. H. Jennings of the Bureau of Entomology have recently returned from the West Indies, where, in association with Dr. Louis W. Sanborn of the Longwood School of Tropical Medicine, they have been investigating pellagra and other tropical diseases in the interests of the Thompson-McFadden Pellagra Commission of the New York Post-Graduate Medical School and Hospital."

Mr. W. J. Schoone, formerly associate entomologist of the New York Agricultural Experiment Station at Geneva, N. Y., has been appointed state entomologist of Virginia and entomologist of the Agricultural Experiment Station at Blacksburg. He began his work there September 1, 1914. Mr. W. J. Price, acting state entomologist, has been retained as associate and will have charge of nursery and garden inspection.

Dr. L. W. Sanborn, who sailed from England in August, to investigate pellagra in the West Indies, returned to England in January, after visiting the United States. In the course of his trip he observed many cases of the disease, one where it was not previously known to exist. Dr. Sanborn's investigations in Southern and Eastern Europe lead him to believe that pellagra is transmitted through the bite of some insect, probably a fly of the genus *Simulium*.

Mr. Arthur H. Rosenfeld, a foreign member of the American Association of Economic Entomologists, and entomologist and acting director of the Tucuman Agricultural Experiment Station in the Argentine Republic, has been named by the governor of Tucuman to be a member of the board to organize and administer the new university of Tucuman. Mr. Rosenfeld was also appointed a member of the rules committee of the University Board and a member of the Roosevelt reception committee on the occasion of ex-President Roosevelt's visit to that Province.

Dr. L. Van Dine resigned as entomologist of the experiment station of the Rio Rico Sugar Producers' Association at the end of the last fiscal year and returned to this country to re-enter the employ of the Bureau of Entomology at Washington. Mr. Van Dine has been assigned by Doctor Howard to make a study of malaria and the malaria-transmitting mosquitoes under the direction of Mr. W. D. Hunter. His work on malaria will relate particularly to the effect of malaria on agriculture and agricultural development in the South and to the bionomics of the species of mosquitoes involved. Mr. Van Dine's address is Bureau of Entomology, Department of Agriculture, Washington, D. C.

At the recent annual meeting of the Entomological Society of America, held at Atlanta, Ga., December 30 and 31, the following officers were elected: president, Dr. Philip P. Calvert, Philadelphia; first vice-president, Prof. James G. Needham, Ithaca, N. Y.; second vice-president, Dr. C. Gordon Hewitt, Ottawa, Can.; secretary and treasurer, Prof. Alexander D. MacGillivray, Urbana, Ill.; executive committee, Philip P. Calvert, James G. Needham, C. Gordon Hewitt, Alexander D. MacGillivray, Herbert Osborn, William M. Wheeler, Vernon L. Kellogg, Nathan Banks, E. P. Felt, and J. M. Aldrich. Prof. T. D. A. Cockerell was reelected a member of the committee on nomenclature, and Dr. C. Gordon Hewitt and Dr. William Barnes were elected fellows of the society.

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